

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر مارس



Questions ? Unit Three | Lesson 1

Part
1

Answered

First Multiple Choice Questions

Questions signed by * are answered in detail.



Interactive
test

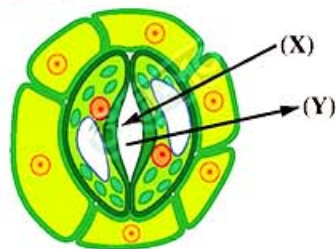
Biosphere

- 1 Which of the following correctly represents the biosphere?
 - (a) The sphere that contains the gases surrounding Earth.
 - (b) The part of the Earth that extends from the depths of oceans to the mountain peaks.
 - (c) The sphere that contains rocks and mountains.
 - (d) The part of the Earth where there is an exchange of energy and no exchange of matter.
- 2 The biosphere interacts with the hydrosphere when
 - (a) living organisms breathe oxygen
 - (b) plants die and decompose in the soil
 - (c) plants absorb water from the soil
 - (d) plants absorb CO_2 gas from air
- 3 The opposite figure illustrates an important vital process for the plant, which of the following equations represents this process?

- (a) $B + D \xrightarrow{\text{Light}} A + C$
 - (b) $A + C \xrightarrow{\text{Light}} B + D$
 - (c) $A + B \xrightarrow{\text{Light}} C + D$
 - (d) $A + B + C \xrightarrow{\text{Light}} D + C$
- 4 From which of the following spheres does the plant absorb water and mineral salts?
 - (a) The atmosphere only.
 - (b) The hydrosphere only.
 - (c) The atmosphere and lithosphere.
 - (d) The hydrosphere and lithosphere.
- 5 * When exposing a plant to a sunny day, which of the following gases its releasing rate from the leaf increases?
 - (a) CO_2
 - (b) O_2
 - (c) N_2
 - (d) H_2
- 6 From the opposite figure that illustrates one of the essential processes through which the plant manufactures its food, what do the letters (X) and (Y) represent respectively?

- (a) Nitrogen and water.
 - (b) Oxygen and carbon dioxide.
 - (c) Water and oxygen.
 - (d) Carbon dioxide and oxygen.

- 7 * Which of the following living organisms is considered the primary source of energy in the ecosystem?
 (a) Corn plant. (b) Locust. (c) Plover bird. (d) Snake.
- 8 * Which of the following living organisms depends in the formation of its food on abiotic components?
 (a) Mouse. (b) Snake. (c) Frog. (d) Wheat plant.
- 9 Which of the following represents a producer organism?
 (a) Yeast fungus. (b) Decomposer bacteria.
 (c) Green alga. (d) *Amoeba*.
- 10 Which of the following organisms differs in its mode of nutrition from the others?
 (a) Human. (b) Green alga. (c) Lion. (d) Deer.
- 11 Some types of fungi play a role in maintaining the balance of the ecosystem through
 (a) producing food in the ecosystem
 (b) providing water necessary for the vital processes
 (c) returning essential elements to the environment
 (d) converting simple compounds into organic compounds
- 12 Which of the following represent abiotic factors in the biosphere?
 (a) Light and plant. (b) Water and bacteria.
 (c) Minerals and air. (d) Animal and human.
- 13 * The opposite figure illustrates a stoma (opening) which is responsible for gas exchange in plant leaves, which choice in the following table expresses gases (X) and (Y) in the photosynthesis process?



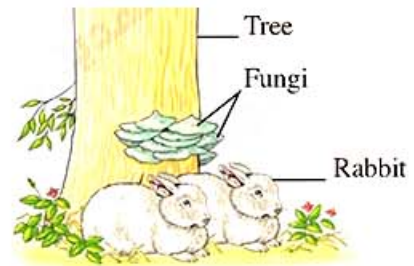
	(X)	(Y)
(a)	O ₂	CO ₂
(b)	CO ₂	O ₂
(c)	H ₂ O	O ₂
(d)	O ₂	H ₂ O

Levels of organization in the biosphere

- 14 Which of the following is correct?
 (a) The community is a group of individuals of the same species living in the same area.
 (b) The ecosystem is an interaction of a community with its surrounding environment.
 (c) The population is a group of individuals of different species living together.
 (d) Biosphere represents different individuals living in a community.

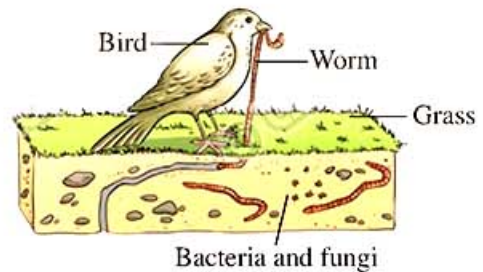
- 15 In the opposite figure, the presence of tree, fungi and rabbits together represents

(a) consumers
(b) producers
(c) a population
(d) a community



- 16 * The opposite figure shows different living organisms that live in a certain area, what do the worms found in this area represent ?

(a) A community.
(b) An ecosystem.
(c) A population.
(d) The biosphere.



- 17 The is the smallest level of organization in the biosphere.

(a) living organism
(b) community
(c) population
(d) ecosystem

- 18 The forest that includes trees, insects and birds represents

(a) a biome
(b) a community
(c) a population
(d) the biosphere

- 19 A herd of wild deer in a forest represents

(a) an ecosystem
(b) a community
(c) a population
(d) the biosphere

- 20 When several ecosystems have similar climate characteristics and dominant organisms, they form what is known as

(a) a community
(b) biosphere
(c) a biome
(d) a population

- 21 The major deserts differ from Amazon rainforests in

(a) their warm humid climate
(b) the presence of drought-adapted plants
(c) the abundance of rainfall in winter
(d) the increase in animals number

- 22 Which of the following includes all biomes on Earth ?

(a) Lithosphere.
(b) The community.
(c) Biosphere.
(d) The population.

- 23 Which of the following represents one of the essential linking mechanisms between the levels of organization in the biosphere?

(a) The population.
(b) The food web.
(c) The community.
(d) The ecosystem.

Second Miscellaneous Questions

1 Write the scientific term for each of the following statements:

- (a) * A sphere that extends from the depths of oceans to the mountain peaks, where life exists.
- * A sphere that contains biotic and abiotic components which work together in a balanced system.
- (b) A sphere that provides the essential gases necessary for respiration and photosynthesis.
- (c) A group of individuals of the same species that share the same place and time, and interact with each other in food, reproduction and protection.
- (d) Group of different populations of multiple species that live in one environment.
- (e) Living organisms and non-living components that interact together in a certain area.
- (f) Several ecosystems that are similar in their climate characteristics and in the dominant organisms within them.

2 Give reasons for:

- (a) Biosphere is a vast integrated system.
- (b) Abiotic factors in a particular area are responsible for determining the type of living organisms.
- (c) The diversity of living organisms' species in different environments.
- (d) Plant acts as biotic factor in the ecosystem.
- (e) Decomposers play an important role in the balance of the ecosystem.
- (f) The ecosystem is considered an integrated unit in nature.

3 What happens in each of the following cases:

- (a) Absence of producers from the ecosystem.
- (b) Disruption of the interaction between biotic and abiotic components in the ecosystem.

4 Compare between each of the following:

- (a) The hydrosphere and the atmosphere, "in terms of: Importance for living organisms".
- (b) Biotic factors and abiotic factors in the biosphere "in terms of: Definition".
- (c) The community and the population "in terms of: Definition - Examples".

5 State the role of the different spheres of Earth in the plant's ability to perform photosynthesis.

6 Which of the following figures represents a population and which represents a community? With explanation.



(1)

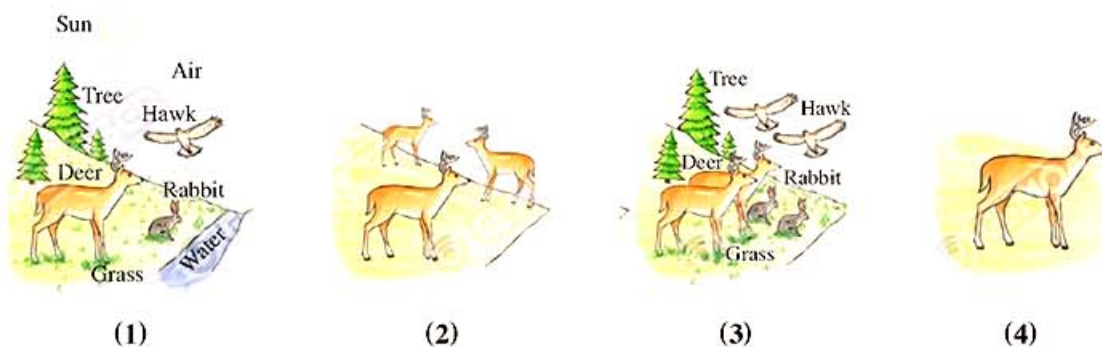


(2)

- 7 Food webs play an important role in linking levels of organization in the biosphere.

Explain this.

- 8 The following figures represent some levels of organization in the biosphere, **arrange** these figures from the lowest to the highest:



- 9 In the light of your study, **what** is the effect of interconnected food chains within the food web on the ecosystem ?

Questions that measure **high levels of thinking**

Answered in detail

Choose the correct answer:

- 1 From the following figures :



Biosphere



Lithosphere



Atmosphere



Hydrosphere

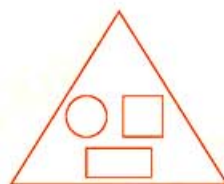
Which of the following figures is correct about the relationship between spheres for the continuation of life and its balance ?



(a)



(b)



(c)



(d)

- 2 Which of the following substances is considered from the reactants and products in the photosynthesis process ?

(a) Oxygen.

(b) Carbon dioxide.

(c) Water.

(d) Glucose.

Questions ? Unit Three | Lesson 1

Part
2

Answered

First Multiple Choice Questions

Questions signed by * are answered in detail.

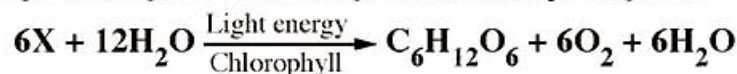


Interactive
test

Trophic levels and patterns in the ecosystem

- 1 Which of the following processes represents the conversion of light energy into chemical energy?
 - (a) Respiration.
 - (b) Photosynthesis.
 - (c) Digestion.
 - (d) Organic decomposition.
- 2 Which of the following types of organisms can be found at more than one level in a food chain?
 - (a) Autotrophs.
 - (b) Herbivores.
 - (c) Carnivores.
 - (d) Decomposers.
- 3 All the following living organisms are autotrophic **except**
 - (a) green plants
 - (b) algae
 - (c) phytoplankton
 - (d) fungi

- 4 The following equation represents a vital process in the green plant:

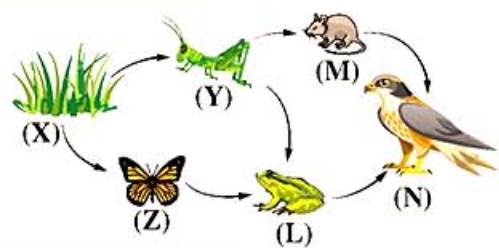


Which of the following represent the vital process and letter (X) respectively?

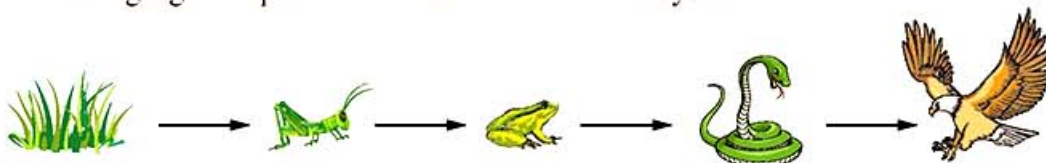
- (a) Respiration / O_2
- (b) Photosynthesis / CO_2
- (c) Respiration / CO_2
- (d) Photosynthesis / O_2

- 5 The opposite figure illustrates a food web, which of the following living organisms represent secondary consumers?

- (a) (Y) and (N).
- (b) (L) and (M).
- (c) (Z) and (M).
- (d) (Y) and (Z).



- 6 The following figure represents a food chain in an ecosystem:



- (1) This food chain includes

- (a) 5 consumers
- (b) 4 carnivores
- (c) a herbivore
- (d) 3 consumers

- (2) Which of the following organisms represents a tertiary consumer?

- (a) Locust.
- (b) Frog.
- (c) Snake.
- (d) Eagle.

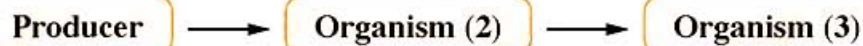
7 * In the photosynthesis process, green plants use

- (a) carbon dioxide and water to produce energy
- (b) oxygen and water to produce energy
- (c) energy to produce carbon dioxide and water
- (d) energy to produce oxygen, water and glucose

8 What is the correct arrangement for a food chain in a terrestrial ecosystem?

- (a) Corn → Mouse → Owl → Eagle.
- (b) Corn → Mouse → Eagle → Owl.
- (c) Corn → Eagle → Mouse → Owl.
- (d) Corn → Owl → Eagle → Mouse.

9 Which of the following choices is correct about the following food chain?



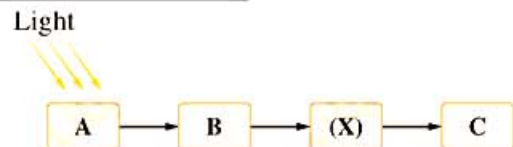
- (a) Organism (2) is a carnivore.
- (b) Organism (2) is a secondary consumer.
- (c) Organism (3) is a carnivore.
- (d) Organism (3) is a tertiary consumer.

10 In the following food chain, which of the following is correct?



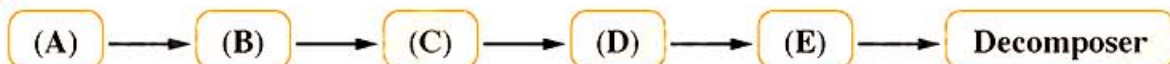
- (a) The hawk is a secondary consumer and the insect is a predator.
- (b) The hawk is a tertiary consumer and the plant is at the first level.
- (c) The insect is at the second level and the frog is a tertiary consumer.
- (d) The insect is a secondary consumer and the plant is a producer.

11 The opposite diagram represents a food chain, which of the following can be represented by letter (X)?



- (a) Rabbit.
- (b) Grass.
- (c) Locust.
- (d) Snake.

12 The following sequence shows 6 living organisms in a food chain:

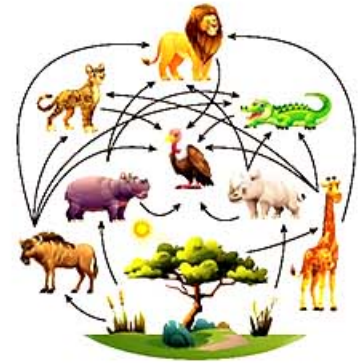


Which of the following choices represents carnivores?

- (a) (B), (C) and (E).
- (b) (A), (D) and (E).
- (c) (A), (C) and (E).
- (d) (C), (D) and (E).

- 13 How many carnivorous organisms are found in the opposite food web?

(a) 1
(b) 3
(c) 4
(d) 6



- 14 Decomposers in food chains perform the process of

(a) food manufacturing by photosynthesis (b) returning nutrients to the ecosystem
(c) energy absorption from the Sun (d) production of new nutrients

- 15 What is the type of organisms that represent the end of any food chain?

(a) Autotrophs. (b) Primary consumers.
(c) Tertiary consumers. (d) Decomposers.

- 16 Which of the following represent primary consumers in an aquatic ecosystem?

(a) Phytoplankton and algae. (b) Aquatic plants and aquatic birds.
(c) Zooplankton and small fish. (d) Large fish and aquatic birds.

- 17 * The following organisms form a food chain in one ecosystem, which of the following represent(s) tertiary consumer(s)?

(a) Zooplankton. (b) Aquatic algae.
(c) Small fish. (d) Shark fish.

- 18 Which of the following represent the predators in the food chain?

(a) Primary consumers only. (b) Secondary consumers only.
(c) Secondary and tertiary consumers. (d) Primary and secondary consumers.

- 19 Which of the following living organisms whose absence affects all the organization levels in the ecosystem negatively?

(a) Primary consumers. (b) Secondary consumers.
(c) Tertiary consumers. (d) Decomposers.

Energy flow in the ecosystem

- 20 Energy transfer in the ecosystem begins with a

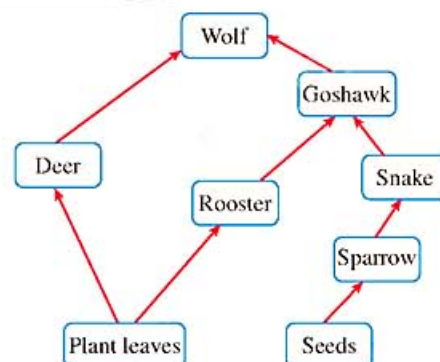
(a) producer (b) primary consumer
(c) secondary consumer (d) decomposer

21 * Energy transfer in a food chain can be studied by understanding the interaction between

- (a) abiotic components with each other
- (b) living organisms and soil
- (c) living organisms with each other
- (d) living organisms and abiotic components

22 In the opposite food web, energy is transferred directly from

- (a) the seeds to the sparrow
- (b) the plant leaves to the goshawk
- (c) the rooster to the wolf
- (d) the seeds to the snake



23 Which of the following indicates the correct path for the energy transfer in a food chain?

- (a) Grass → Cow → Lion → Decomposing bacteria.
- (b) Decomposing bacteria → Grass → Cow → Lion.
- (c) Grass → Cow → Decomposing bacteria → Lion.
- (d) Cow → Grass → Decomposing bacteria → Lion.

24 Studying the energy flow through the different trophic levels can be done through the

- (a) communities
- (b) ecological pyramids
- (c) ecosystems
- (d) biomes

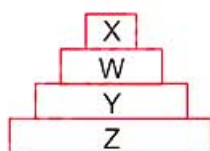
25 The base of the energy pyramid is occupied by organisms.

- (a) producer
- (b) primary consumer
- (c) tertiary consumer
- (d) decomposer

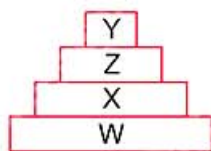
26 The following diagram represents a food chain:



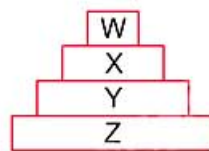
Which of the following represents the energy pyramid that expresses this chain?



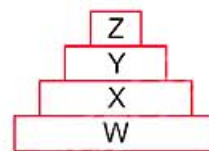
(a)



(b)



(c)



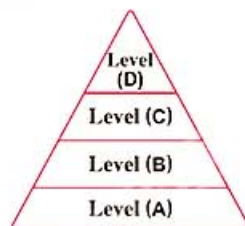
(d)

- 27 What happens to the amount of energy that is transferred from one trophic level to the next level in the energy pyramid?

(a) Increases. (b) Decreases.
(c) Decreases then increases. (d) Remains almost constant.

- 28 The opposite figure represents an energy pyramid in which the organisms at level (A) obtain their energy from

(a) producers (b) organisms at level (B)
(c) the Sun (d) organisms at level (D)



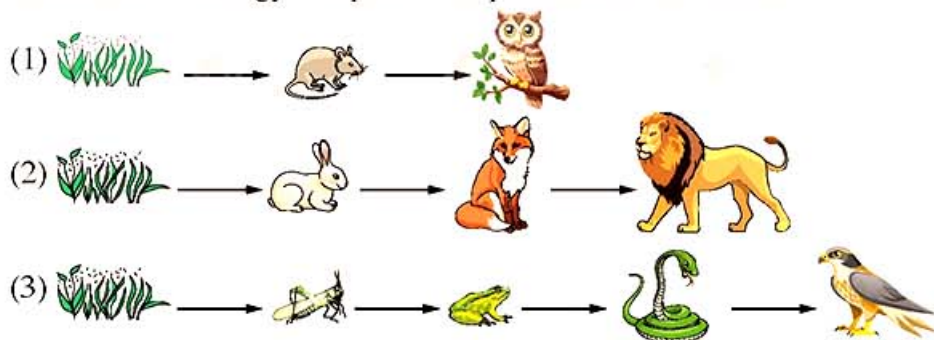
- 29 * Two food chains (X) and (Y); (X) includes 4 trophic levels, while (Y) includes 3 trophic levels. If you know that the amount of energy at the last level of each chain is equal, which of the following can explain this?

(a) The amount of energy in the producer of chain (X) is greater than that in chain (Y).
(b) The amount of energy in the producer of chain (Y) is greater than that in chain (X).
(c) The amount of energy in the producers of both chains (X) and (Y) is equal.
(d) The percentage of energy transfer from one level to the other in the two chains is different.

- 30 The following organisms form a food chain in a single ecosystem. Which of these organisms will get the least amount of energy in the chain?

(a) Green alga. (b) Shrimp. (c) Tuna fish. (d) Shark fish.

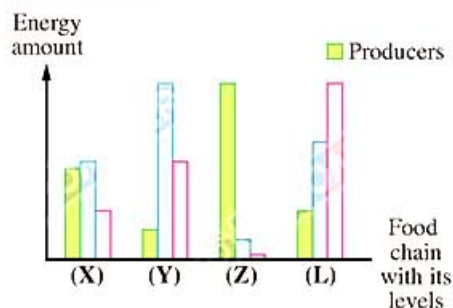
- 31 Which of the following food chains has the greatest loss in energy, supposing that the amount of energy is equal in the producers of all chains?



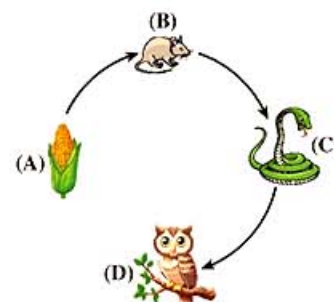
(a) (1). (b) (2).
(c) (3). (d) All of them are equal in the lost amount of energy.

- 32 The opposite graph illustrates the energy amount in the trophic levels of four food chains (X), (Y), (Z) & (L), in which food chain the energy is represented through its levels correctly?

(a) (X). (b) (Y).
(c) (Z). (d) (L).



- 33 The opposite diagram illustrates a food chain, which of the following living organisms in the food chain contains the highest amount of energy that is transferred to the next organism?

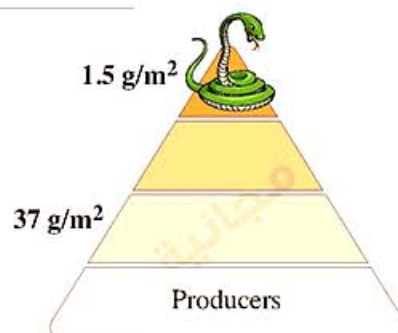


- (a) (A). (b) (B).
(c) (C). (d) (D).

- 34 Which of the following happens to the numbers of living organisms as you move from the base of the numbers pyramid to its top?

- (a) Increase. (b) Remain constant.
(c) Decrease. (d) Differ according to the ecosystem.

- 35 From the opposite figure, which represents a biomass pyramid in an ecosystem, which of the following could represent the biomass of secondary consumers?



- (a) 809 g/m^2 (b) 50 g/m^2
(c) 11 g/m^2 (d) 1 g/m^2

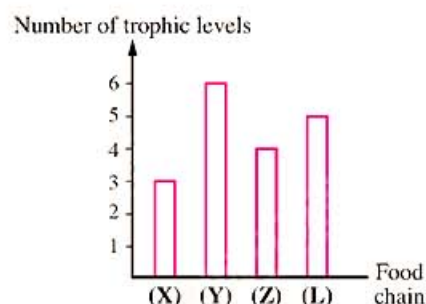
- 36 The organisms found at the of energy pyramid, receive amount of energy compared to the mid-pyramid organisms.

- (a) top – same (b) bottom – less
(c) top – less (d) bottom – same

- 37 The ratio between the amount of energy transferred to the organisms at the top of energy pyramid and the amount of energy transferred to the organisms at the middle of the pyramid

- (a) is greater than one (b) is less than one
(c) is equal one (d) cannot be determined

- 38 * The opposite graph illustrates the number of trophic levels in four food chains, through which of these chains the smallest amount of energy is lost, in case of the amount of energy in all producers is equal?



- (a) (X). (b) (Y).
(c) (Z). (d) (L).

- 39 If the amount of energy transferred to the secondary consumer in a food chain equals 2 J, what is the amount of energy in the producer?
 (a) 0.2 J (b) 20 J (c) 200 J (d) 2000 J
- 40 If the amount of energy that the rabbit obtains from plants is 100 J, what is the amount of energy that can reach the fox that feeds on this rabbit?
 (a) 10 J (b) 50 J (c) 90 J (d) 100 J
- 41 The percentage of energy lost when moving from any trophic level to the next level in the energy pyramid is equal to.....
 (a) 1% (b) 10% (c) 90% (d) 100%
- 42 * In a food chain that includes 4 trophic levels, if the amount of energy that reaches the primary consumer is 100 J, what is the amount of energy lost when moving from the producer till the tertiary consumer?
 (a) 9 J (b) 90 J (c) 990 J (d) 999 J
- 43 From the following food chain, if the amount of energy in an amount of grass equals 20000 J:



The amount of transferred energy from the primary consumer to the secondary consumer is nearly equal

- (a) 2000 J (b) 200 J (c) 20 J (d) 2 J
- 44 If consumer (X) feeds on consumer (Y), which of the following represents all the energy transferred from (Y) to (X)?
 (a) Used energy in (X) movement. (b) Used energy in (Y) digestion.
 (c) Energy stored in (X) tissues. (d) Energy stored in (Y) tissues.
- 45 * Study the following food chain, then answer:
- ```

 graph LR
 Plant[Plant] --> A["(A)"]
 A --> B["(B)"]
 B --> C["(C)"]
 C --> D["(D)"]

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- Which symbol in the food chain refers to an organism containing 10 times the amount of energy found in the tertiary consumer?
- (a) (A). (b) (B). (c) (C). (d) (D).
- 46 Which of the following statements is **incorrect** about the food chains?  
 (a) Organisms of the food chain store chemical energy and lose thermal energy.  
 (b) Light energy is considered a source for all forms of energy in the food chain.  
 (c) The predators get benefit from the thermal energy produced from the respiration of organisms at the next level.  
 (d) Nutrients return to the soil through the decomposers.



47 The smart collars aim to measure the following parameters, **except** .....

- (a) animal's movement rate                      (b) pulse  
(c) body temperature                              (d) biomass

## Second Miscellaneous Questions

1 Write the scientific term for each of the following statements:

- (a) Living organisms that can convert inorganic compounds into organic compounds that store energy.  
(b) A vital process in which light energy is converted into energy stored in organic compounds such as sugars.  
(c) Living organisms that cannot manufacture their own food but obtain it from producers or other consumers.  
(d) Living organisms that feed directly on plants.  
(e) Living organisms that feed directly on herbivores.  
(f) Living organisms that recycle matter and convert it into simple mineral elements within the ecosystem.

2 Give reasons for:

- (a) Green plants are from producers, while animals are from consumers.  
(b) Consumers are called heterotrophs.  
(c) Producers represent the base of energy pyramid and the largest level.  
(d) Predators represent secondary and tertiary consumers in the food chain.  
(e) Predators are necessary for the stability of ecosystem.  
(f) In a food chain, the energy transferred from producers to the tertiary consumer is less than the energy transferred to the secondary consumer.  
(g) The decreased number of large predators compared to the number of plants and herbivores in a balanced ecosystem.  
(h) The number of organisms is represented by the trophic levels in a pyramidal (hierarchical) shape within the balanced ecosystem.

3 What happens in case of: the absence of decomposers from the ecosystem.

4 Compare between each of the following:

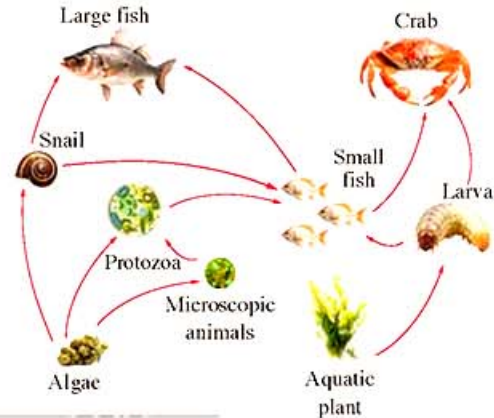
- (a) Autotrophic organisms and heterotrophic organisms "in terms of: Definition - Examples".  
(b) Primary consumer and secondary consumer in a food chain "in terms of: Source of food."

5 State the idea of work and importance of smart collars that are used around the wild animals neck.

6 Mention by a balanced chemical equation the process of photosynthesis.

- 7 The opposite figure, shows a food web in a community of an aquatic ecosystem, mention the name(s) for each of the following:

- A producer.
- A secondary consumer that is eaten by two predators.
- An organism that competes with small fish for food.



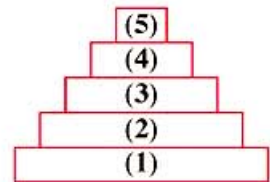
- 8 Rearrange the following organisms to form a food chain from each group:

- Bacteria and fungi - Snakes - Insects - Mice - Plants - Hawks.
- Whale - Decomposing bacteria - Small fish - Crustaceans - Large fish - Algae.

- 9 Studying the modes of nutrition has a great importance. Explain this.

- 10 The opposite figure represents an energy pyramid:

- Replace the numbers shown in it with the following organisms: (Locust / Hawk / Grass / Snake / Frog)
- Which of these organisms represents the secondary consumer and which of them represents the tertiary consumer?



- 11 If the energy pyramid of one of the food chains starts with an organism that has an amount of energy equals 2000 J, and a part of this energy is transferred through four trophic levels:

- Draw the energy pyramid representing this chain, illustrating the amount of energy transferred to each trophic level.
- Calculate the amount of energy lost when transferring from the producer till the tertiary consumer:

- 12 In the light of your study, what is the role of modern technology in saving the Iberian lynx herds from extinction?

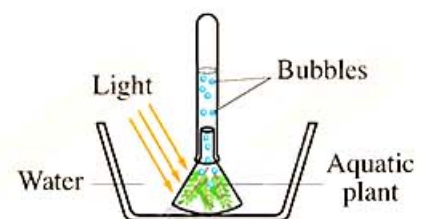
## Questions that measure high levels of thinking

Answered in detail

### Choose the correct answer:

- 1 The opposite figure illustrates an aquatic plant exposed to light for several hours, what is the gas which is supposed to be inside the bubbles?

- Oxygen.
- Nitrogen.
- Hydrogen.
- Carbon dioxide



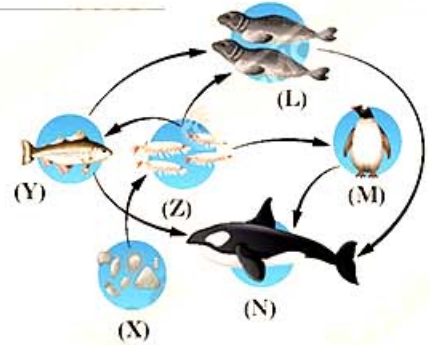


- 2 The opposite table represents 5 living organisms and their food. Which of the following represents a correct food chain?

| Living organism | Living organism food |
|-----------------|----------------------|
| (1)             | Insects              |
| (2)             | Reptiles and mice    |
| (3)             | Grass and seeds      |
| (4)             | Dead animals         |
| (5)             | Rabbits and owl      |

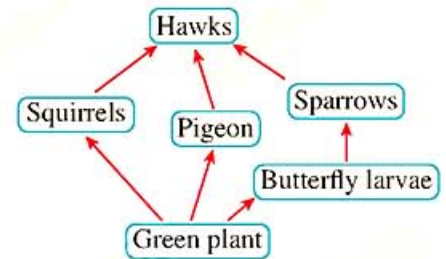
- (a) Berries → (1) → (2) → (3).  
 (b) Grass → (3) → (2).  
 (c) Cactus → (1) → (4).  
 (d) Seeds → (4) → (2) → (5).

- 3 From the opposite food web, organism (N) obtains the least amount of energy when it eats .....



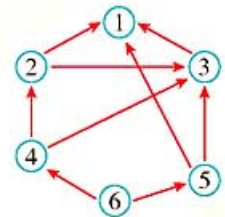
- (a) organism (L) that fed on organisms (Z)  
 (b) organism (Y) that fed on organisms (Z)  
 (c) organism (M) that fed on organisms (Z)  
 (d) organism (L) that fed on organism (Y)

- 4 The opposite diagram illustrates the trophic relationships in one environment. What is expected to happen when all the sparrows die?



- (a) Plant yield deteriorates.  
 (b) The amount of food available to squirrels increases.  
 (c) The number of pigeons increases.  
 (d) The number of butterflies decreases.

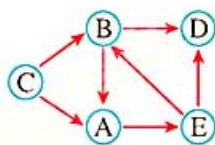
- 5 In the opposite food web the numbers represent the organisms of the web, which of the following represent(s) a predator?



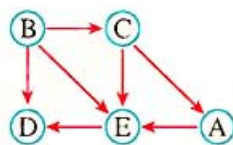
- (a) (1), (2) and (3).  
 (b) (1) only.  
 (c) (2) and (3) only.  
 (d) (4) and (5).

- 6 From the opposite table which shows some of the organisms found in a community and their food, which of the following food webs represents the trophic relationships between these organisms?

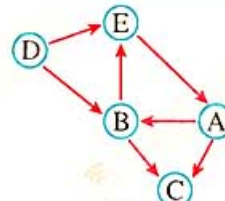
| Living organism | Feeds on |
|-----------------|----------|
| (A)             | B, C     |
| (B)             | C, E     |
| (D)             | B, E     |
| (E)             | A        |



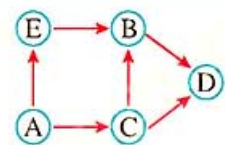
(a)



(b)



(c)



(d)

# Questions ? Unit Three | Lesson 1

Part  
3

Answered

## First Multiple Choice Questions

Questions signed by \* are answered in detail.



Interactive  
test

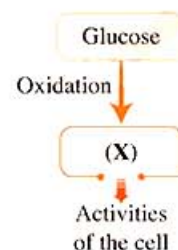
### Carbohydrates

- 1 What is the ratio between carbon, hydrogen and oxygen atoms in the monosaccharide molecule respectively?  
(a) 1 : 1 : 2      (b) 1 : 2 : 1      (c) 2 : 1 : 1      (d) 2 : 2 : 1
- 2 Which of the following sugars represents an example for the simplest form of carbohydrates?  
(a) Cellulose.      (b) Starch.      (c) Lactose.      (d) Fructose.
- 3 Which of the following is from the monosaccharides?  
(a) Sucrose.      (b) Lactose.      (c) Glucose.      (d) Glycogen.
- 4 Which of the following is from the disaccharides?  
(a) Starch.      (b) Sucrose.      (c) Cellulose.      (d) Fructose.
- 5 Which of the following sugars is called grape sugar?  
(a) Sucrose.      (b) Lactose.      (c) Glucose.      (d) Fructose.
- 6 Fructose sugar is called .....  
(a) grape sugar      (b) fruit sugar      (c) cane sugar      (d) milk sugar
- 7 Which of the following sugars is called milk sugar?  
(a) Glucose.      (b) Fructose.      (c) Glycogen.      (d) Lactose.
- 8 Which of the following sugars is called the cane sugar?  
(a) Starch.      (b) Sucrose.      (c) Fructose.      (d) Cellulose.
- 9 Which of the following carbohydrates is involved in building plant cell walls?  
(a) Cellulose.      (b) Starch.      (c) Glycogen.      (d) Lactose.
- 10 Which of the following carbohydrates is stored in the leaves and tubers of plant?  
(a) Glucose.      (b) Fructose.      (c) Starch.      (d) Glycogen.
- 11 Which of the following carbohydrates is stored in human muscles?  
(a) Starch.      (b) Glycogen.      (c) Cellulose.      (d) Lactose.
- 12 All of the following are polysaccharides, except .....  
(a) glucose      (b) starch      (c) cellulose      (d) glycogen



- 13 From the opposite diagram which expresses a vital process that occurs inside the living cell, what does letter (X) represent?

(a) Water.  
(b) Starch.  
(c) ATP molecules.  
(d) Mineral salts.



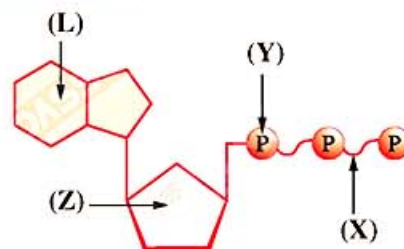
- 14 In the opposite compound :

- (1) Which of the following represent(s) the adenosine molecule ?

(a) (L) and (Y). (b) (L) and (Z).  
(c) (Z) and (Y). (d) (Z) only.

- (2) Which of the following parts is specialized in storing energy?

(a) (X). (b) (Y). (c) (Z). (d) (L).



- 15 Which of the following characterizes the structure of ATP molecule from ADP molecule?

(a) Type of sugar. (b) Absence of high energy bond.  
(c) Number of phosphate groups. (d) Number of carbon atoms.

- 16 \* Which of the following is/are considered the direct source of energy in living cells?

(a) Glucose. (b) Glycogen.  
(c) ATP molecules (d) ADP molecules

- 17 What is the direct source of the stored energy in ATP molecule that is required for the contraction of skeletal muscle?

(a) Protein. (b) Glucose (c) Starch. (d) Glycogen.

- 18 CGM devices work on .....

(a) lowering blood glucose level  
(b) converting carbohydrates into ATP molecules  
(c) tracking the availability of lipids as an energy source  
(d) measuring blood glucose level

- 19 Continuous glucose monitoring (CGM) devices help athletes to obtain constant energy through all of the following, **except** .....

(a) understanding the effect of carbohydrates on energy production  
(b) measuring the amount of energy consumed  
(c) accurately adjusting the rate of physical effort  
(d) adjusting the diet pattern

- 20 \* If you know that the number of hydrogen atoms in a monosaccharide = X, what is the number of carbon atoms ?

(a)  $\frac{1}{2} X$  (b)  $X^2$  (c)  $2 X$  (d)  $3 X$

- 21 Which of the following could represent the normal sequence for energy production inside the human body cells, when drinking a cup of sugarcane juice ?
- (a) Starch  $\longrightarrow$  Glucose  $\longrightarrow$  Energy  $\longrightarrow$  ATP.
  - (b) Sucrose  $\longrightarrow$  Glucose  $\longrightarrow$  Energy  $\longrightarrow$  ATP.
  - (c) Lactose  $\longrightarrow$  Glucose  $\longrightarrow$  Energy  $\longrightarrow$  ATP.
  - (d) Lactose  $\longrightarrow$  Glucose  $\longrightarrow$  ATP  $\longrightarrow$  Energy.

- 22 On which of the following do the muscles depend to produce energy required for their contraction and relaxation during running ?
- (a) Starch.
  - (b) Glycogen.
  - (c) Mineral salts.
  - (d) Protein.

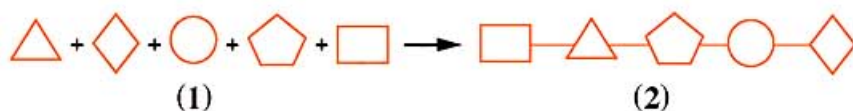
### Proteins

- 23 Which of the following elements are present in both carbohydrates and proteins?
- (a) Carbon, hydrogen and nitrogen.
  - (b) Carbon, sulfur and nitrogen.
  - (c) Carbon, hydrogen and oxygen.
  - (d) Nitrogen, sulfur and oxygen.
- 24 Which of the following represent the main structural material of organisms' body?
- (a) Carbohydrates.
  - (b) Proteins.
  - (c) Lipids.
  - (d) Nucleic acids.
- 25 From which of the following organic compounds are the muscles, enzymes and some hormones made?
- (a) Nucleic acids.
  - (b) Carbohydrates.
  - (c) Lipids.
  - (d) Proteins.
- 26 Which of the following doesn't belong to proteins?
- (a) Insulin.
  - (b) Glycogen.
  - (c) Keratin.
  - (d) Amylase enzyme.
- 27 Which of the following may occur when changing the arrangement of amino acids forming an enzyme?
- (a) Amount of enzyme increases.
  - (b) Shape of enzyme changes.
  - (c) Concentration of enzyme decreases.
  - (d) The enzyme activity increases .
- 28 \* If you know that pepsin enzyme digests proteins, which of the following isn't applied to pepsin enzyme?
- (a) It is consumed during chemical reactions.
  - (b) It increases the speed of chemical reactions.
  - (c) It disintegrate proteins to smaller parts.
  - (d) It is made up of amino acids.

- 29 Which of the following organic molecules is found in all the living organisms cells ?
- (a) Starch.
  - (b) Cellulose.
  - (c) Glycogen.
  - (d) Protein.



- 30 Using the following figures :



Which of the following choices could represent this figure ?

|     | (1)         | (2)       |
|-----|-------------|-----------|
| (a) | Starch      | Glucose   |
| (b) | Amino acids | Protein   |
| (c) | Glucose     | Cellulose |
| (d) | Glucose     | Starch    |

### Lipids

- 31 Which of the following elements are basically present in both proteins and lipids?  
 (a) Carbon, hydrogen and oxygen. (b) Carbon, hydrogen and nitrogen.  
 (c) Nitrogen, oxygen and hydrogen. (d) Nitrogen, sulfur and hydrogen.
- 32 \* Which of the following nutrients represents the highest source of energy?  
 (a) 10g glucose. (b) 10g starch. (c) 10g glycogen. (d) 10g fats.
- 33 Which of the following represent(s) an essential part in the structure of cell membranes?  
 (a) Oils. (b) Phospholipids. (c) Glycogen. (d) Cellulose.
- 34 \* Which of the following substances do animal cells use to obtain energy?  
 (a) Starch and cellulose. (b) Glycogen and fats.  
 (c) Cellulose and oils. (d) Oils and starch.
- 35 Which of the following is/are involved in the formation of some hormones?  
 (a) Oils. (b) Cellulose. (c) Phospholipids. (d) Cholesterol.
- 36 1 calorie equals .....  
 (a) 41.8 J (b) 8.41 J (c) 4.18 J (d) 84.1 J
- 37 The ratio between the caloric content of white sugar to that of pure vegetable oil, when their amounts are equal is .....  
 (a) equal one (b) greater than one (c) smaller than one (d) equal zero
- 38 Assuming that the amount of energy obtained by the body when oxidizing 5 grams of sugar equals (X), what is the approximate amount of fats in grams that the body needs to obtain the same amount of energy ?  
 (a) 2 (b) 5 (c) 10 (d) 15

- 39 Which of the following confirms the role of lipids in maintaining the life of some animals to adapt with the different environmental conditions ?
- (a) Lipids are considered an important source for obtaining energy in the body.
  - (b) The stored fats beneath the skin in polar bear.
  - (c) Lipids are involved in the structure of cell membranes.
  - (d) Lipids are involved in the structure of some hormones.

- 40 \* Which of the following choices is correct regarding the organic compounds that an Arctic rabbit can store in its body ?

|     | Carbohydrates | Proteins | Lipids |
|-----|---------------|----------|--------|
| (a) | ✓             | ✓        | ✗      |
| (b) | ✓             | ✗        | ✓      |
| (c) | ✗             | ✓        | ✓      |
| (d) | ✗             | ✗        | ✓      |

#### Nucleic acids

- 41 Which of the following carries the genetic information in human?
- (a) DNA
  - (b) RNA
  - (c) ATP
  - (d) ADP
- 42 Which of the following is **not** involved in the structure of nucleotide?
- (a) Phosphate group.
  - (b) Sulphur element.
  - (c) Pentose sugar.
  - (d) Nitrogenous base.
- 43 The genetic code originates due to the difference in .....
- (a) the arrangement of phosphate groups
  - (b) the type of pentose sugar
  - (c) the arrangement of nitrogenous bases
  - (d) the number of atoms that make up the pentose sugar
- 44 CRISPR-Cas9 technique is used in modifying ..... molecules.
- (a) DNA
  - (b) RNA
  - (c) ATP
  - (d) ADP
- 45 Which of the following nitrogenous bases **isn't** targeted by CRISPR-Cas9 technique?
- (a) Adenine.
  - (b) Thymine.
  - (c) Uracil.
  - (d) Guanine.
- 46 Which of the following **isn't** from the uses of CRISPR-Cas9 technique?
- (a) Improvement of the resulted strains.
  - (b) Protein synthesis.
  - (c) Disease resistance.
  - (d) Gene therapy.
- 47 Which of the following represent the structural units of nucleic acids?
- (a) Monosaccharides.
  - (b) Amino acids.
  - (c) Fatty acids.
  - (d) Nucleotides.
- 48 How many types of nucleotides are there in RNA?
- (a) 8
  - (b) 5
  - (c) 4
  - (d) 2



49 Which of the following nitrogenous bases characterizes DNA molecule?

- (a) A (b) U (c) C (d) T

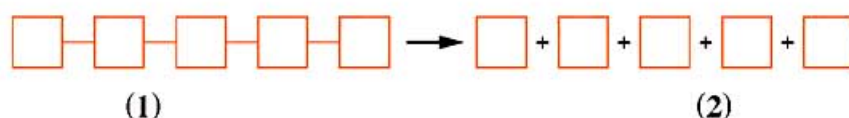
50 \* Which of the following choices is correct ?

|     | ATP molecule                       | DNA nucleotide                      |
|-----|------------------------------------|-------------------------------------|
| (a) | It contains one phosphate group    | It contains two phosphate groups    |
| (b) | It contains three phosphate groups | It contains one phosphate group     |
| (c) | It is found in human cells only    | It is found in all living organisms |
| (d) | It releases energy                 | It is found in animal cells only    |

51 Genetic traits are transmitted from parents to their offspring through .....

- (a) proteins found in the body cells (b) carbohydrates found in the body cells  
(c) nucleotides sequences on RNA (d) nucleotides sequences on DNA

52 Using the following figures :



Which of the following choices is correct ?

|     | (1)         | (2)         |
|-----|-------------|-------------|
| (a) | Amino acids | Protein     |
| (b) | Protein     | Fatty acids |
| (c) | Nucleotides | DNA         |
| (d) | DNA         | Nucleotides |

53 Which of the following statements about the electron microscope is incorrect?

- (a) It enabled scientists to study the structure of DNA at a molecular level.  
(b) Its action depends on using a beam of electrons.  
(c) Its action depends on using the visible light.  
(d) It helped in understanding how molecules are arranged inside cells.

54 Which of the following structures in the plant cell can be distinguished by electron microscope only ?

- (a) Cell wall. (b) Nucleus.  
(c) Phospholipids of cell membrane. (d) Cytoplasm.

## Second Miscellaneous Questions

### 1 Write the scientific term for each of the following statements:

- Compounds that are formed from the combination of many monosaccharides.
- The direct source of energy in living cells.
- The building unit of proteins.
- The building unit of nucleic acids.
- The amount of heat produced when 1g of food is combusted.
- Fat molecules containing phosphate group that enter in the structure of cell membrane.
- Nucleic acid that carries the genetic information inside the cell nucleus in eukaryotes.
- Nucleic acid that participates in translating the genetic information into proteins in human.
- The total of all genetic information in the living organism.

### 2 Give reasons for:

- Carbohydrates are the main source of energy in living organisms.
- ATP molecules are the direct source of energy in living cells.
- ADP molecules are used to store energy.
- Proteins are necessary for building the body of a living organism.
- Lipids are considered a concentrated source of energy.
- Nucleic acids are the basis of heredity in all living organisms.

### 3 What happens in each of the following cases:

- Absence of ATP molecules in living cells.
- Similarity in the arrangement, number and types of amino acids that make up proteins.
- Changing an amino acid in a specific protein.

### 4 Compare between each of the following:

- Starch and glycogen **"in terms of: Storage locations for each"**.
- Carbohydrates and proteins **"in terms of: Constituent elements - Building unit"**.
- Structural proteins and enzymatic proteins **"in terms of: Importance - Examples"**.
- Proteins and nucleic acids **"in terms of: Building unit"**.
- DNA and RNA **"in terms of: Importance - Number of strands - Nitrogenous bases"**.

### 5 State the importance of each of the following:

- |                                   |                          |
|-----------------------------------|--------------------------|
| (a) Cellulose.                    | (b) Chitin.              |
| (c) Glucose in energy production. | (d) CGM devices          |
| (e) Keratin in human body.        | (f) Lipids.              |
| (g) CRISPR-Cas9 technique.        | (h) Electron microscope. |

### 6 Illustrate the idea of work for each of the following:

- CRISPR-Cas9 technique.
- Electron microscope.

### 7 The following diagram shows a polysaccharide stored in a green plant. Based on this, answer:



- What is the name of this sugar?
- This sugar may contribute to energy production in the cell. Explain this.

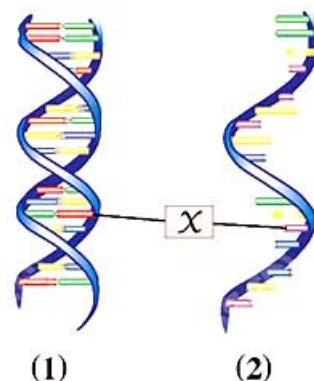


- 8 The following table shows the percentages of proteins, fats and carbohydrates in 4 different meals:

| Meal | Proteins % | Fats % | Carbohydrates % |
|------|------------|--------|-----------------|
| (1)  | 76         | 9      | 15              |
| (2)  | 17         | 0      | 83              |
| (3)  | 33         | 32     | 35              |
| (4)  | 15         | 83     | 2               |

- (a) Which meal(s) has/have the greatest probability for being stored in the liver cells?  
 (b) Which meal(s) is/are most utilized by the body in building its tissues?
- 9 "Reducing the carbohydrates intake helps in getting rid of stored body fats". How far is this statement correct? With explanation.
- 10 In the two opposite figures :

Structure (X) in figure (1) differs from that in figure (2). Explain this.



### Questions that measure high levels of thinking

Answered in detail

#### Choose the correct answer:

- 1 If we supposed that some of the nucleotide components can be used in synthesizing ATP molecules from ADP molecules. How many ATP molecules may be produced from the breakdown of 5 nucleotides ?  
 (a) 1 (b) 2 (c) 5 (d) 7
- 2 Which of the following is the reason that ATP molecules represent the energy currency in the cell ?  
 (a) They are the smallest molecules of energy in the cell.  
 (b) They store the least amount of energy in the cell.  
 (c) They transfer the energy easily to perform the functions of the cell.  
 (d) They can save their energy for a long period.

# Questions ?

Unit Three | Lesson 2

Part  
1

Answered

First

## Multiple Choice Questions

Questions signed by \* are answered in detail.



Interactive  
test

### Transport in plant

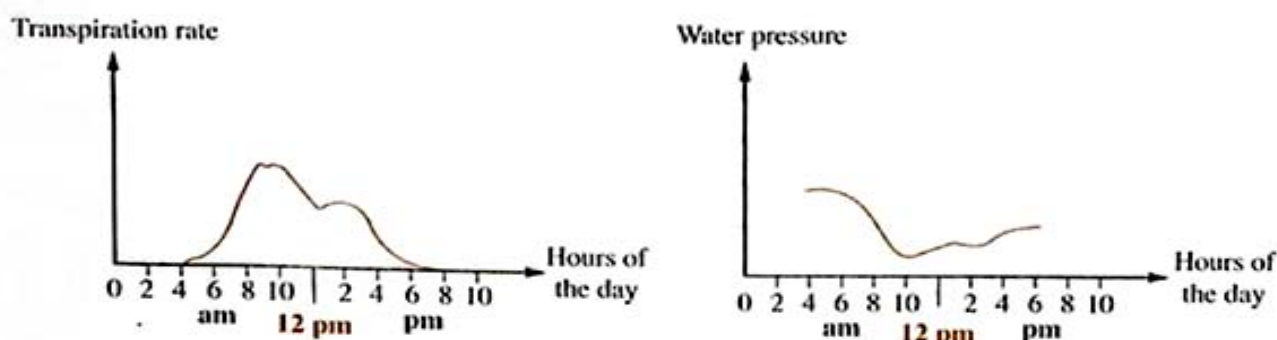
- 1 Transport process occurs in the xylem tissue of plant by .....
  - (a) living structures that form continuous channels
  - (b) living structures that form long, hollow tubes
  - (c) non-living structures supported by lignin
  - (d) non-living structures attached to companion cells
- 2 Tracheids in the stem of mature plant are considered non-living cells that .....
  - (a) store food
  - (b) facilitate water passage through them
  - (c) perform photosynthesis
  - (d) increase the water pressure through them
- 3 The phloem tissue mainly consists of .....
  - (a) tracheids and companion cells
  - (b) tracheids and vessels
  - (c) sieve tubes and companion cells
  - (d) vessels and sieve tubes
- 4 The companion cells in the phloem tissue help in .....
  - (a) storing sugars in winter
  - (b) preventing the compression of sieve tubes
  - (c) acquiring the tissue with strength and stiffness
  - (d) regulating the movement of nutrients
- 5 Which of the following substances doesn't/don't transfer through the plant transport system?
  - (a) Water.
  - (b) Glucose.
  - (c) Cellulose.
  - (d) Magnesium ions.
- 6 During the winter, sugars are stored in some plants as sugar beet in .....
  - (a) stems
  - (b) leaves
  - (c) roots
  - (d) flowers
- 7 Which of the following is not a consequence of the presence of lignin in xylem tissue?
  - (a) The presence of cohesion forces among water molecules.
  - (b) The presence of adhesion forces between water molecules and vessel walls.
  - (c) Acquiring the vessels with strength and stiffness.
  - (d) Preventing the compression of xylem vessel.



8 All the following are considered a reason for the transport of water upward in the plant, **except** .....

- (a) the plant cells contain a self-pump to rise water
- (b) the cohesion forces among the molecules of water
- (c) the transpiration process which causes the presence of the continuous attraction of water column
- (d) the adhesion forces between the molecules of water and xylem vessel walls

9 The two following graphs illustrate the rate of transpiration process and the water pressure in the plant leaf cells within the day hours:



What do you conclude from your study to these graphs?

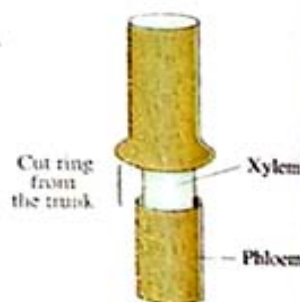
- (a) As the transpiration rate increases, the water pressure inside leaf's cells decreases.
- (b) As the transpiration rate increases, the water pressure inside leaf's cells increases.
- (c) At 10 am, the leaf stomata become closed.
- (d) At 4 am, the leaf stomata become opened.

10 Which of the following is **not** from the importance of transpiration process?

- (a) Regulating the plant temperature.
- (b) The coherence of the water column as it moves through the xylem vessels.
- (c) Adding water vapor to the atmosphere.
- (d) Getting rid of excess water in plant.

11 When removing a ring from the plant's trunk as in the opposite figure, which of the following **isn't** expected to happen?

- (a) Water will be transported from the soil to roots.
- (b) Water will be transported from the stem to leaves.
- (c) Mineral salts will be transported from the stem to leaves.
- (d) Sugars will be transported from leaves to roots.

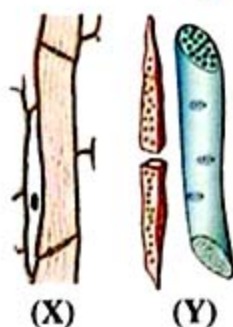


12 What happens to the transpiration rate and the water flow rate in the stem respectively starting from the morning till noon?

- (a) Increases / Increases.
- (b) Increases / Decreases.
- (c) Decreases / Increases.
- (d) Decreases / Decreases.

13 In which is (X) similar with (Y) in the opposite figure?

- (a) Transporting the formed food in leaves.
- (b) Transporting water and salts in one direction only.
- (c) Both are living structures.
- (d) Both are vascular tissues.

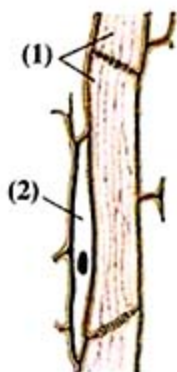


14 Which of the following choices is correct about xylem tissue and phloem tissue?

|     | Xylem tissue                          | Phloem tissue                               |
|-----|---------------------------------------|---------------------------------------------|
| (a) | Through which transport needs energy  | Through which transport doesn't need energy |
| (b) | It is composed of living cells        | It is composed of non-living cells          |
| (c) | The transport occurs in one direction | The transport occurs in two directions      |
| (d) | It transports amino acids             | It transports water and mineral salts       |

15 The opposite figure illustrates a longitudinal section in phloem tissue, which of the following substances pass(es) from cell no. (2) to cell no. (1)?

- (a) Glucose.
- (b) Salts.
- (c) Water.
- (d) ATP molecules.



16 During transpiration process, the ratio between the number of water molecules in a cell of the leaf to the number of water molecules in a cell of the stem is .....

- (a) less than one
- (b) greater than one
- (c) equal to one
- (d) equal to zero

17 \* One of the rodents cut the phloem tissue circularly in a plant stem at the two shown sites in the opposite figure. So that, the size of fruits is affected, which of the following figures expresses the size of fruits after a period of time?



(a)



(b)



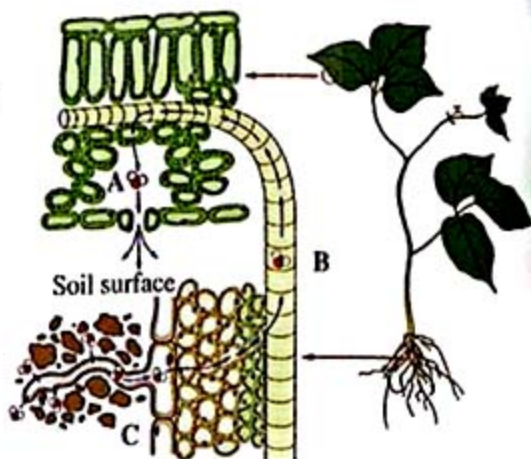
(c)



(d)

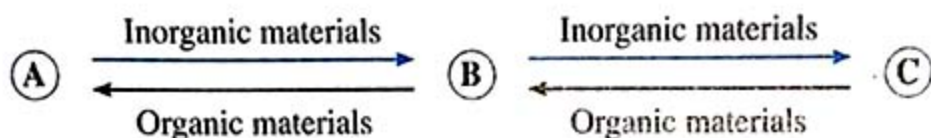


- 18 \* The opposite figure shows a longitudinal section in plant parts and the water pathway through them from (C) to (A):



- (1) What is the correct arrangement for the values of water pressure in these parts?
- (a)  $A > B > C$       (b)  $B > A > C$   
 (c)  $C > B > A$       (d)  $C > A > B$
- (2) When the water pressure becomes negative at point (A), .....
- (a) the cohesion forces between water molecules are arisen  
 (b) the adhesion forces between water molecules and vessel walls are arisen  
 (c) the pulling force to water column is arisen  
 (d) hydrogen bonds between water molecules are arisen

- 19 \* If the following diagram represents the direction of movement of materials inside a tree:

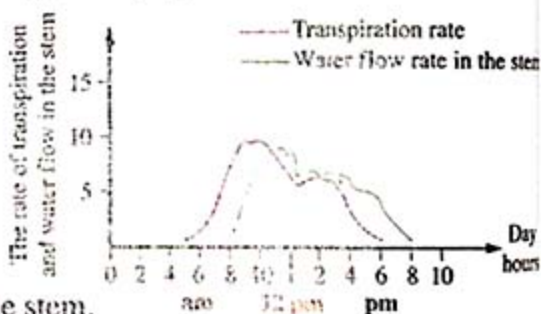


Which choice in the following table expresses (A), (B) and (C) correctly?

|     | (A)  | (B)  | (C)  |
|-----|------|------|------|
| (a) | Root | Leaf | Stem |
| (b) | Leaf | Stem | Root |
| (c) | Leaf | Root | Stem |
| (d) | Root | Stem | Leaf |

- 20 \* What do you conclude from your study to the opposite graph?

- (a) The transpiration rate is constant throughout the day.  
 (b) There is no relation between the water flow rate in the stem and the transpiration rate.  
 (c) The maximum transpiration rate precedes in time the maximum rate of water flow in the stem.  
 (d) The relation between the water flow rate in stem and transpiration rate is inversely.



#### Transport in human

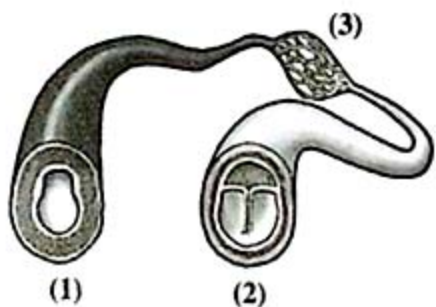
- 21 Which of the heart chambers receives deoxygenated blood?

- (a) Right atrium.      (b) Right ventricle.      (c) Left atrium.      (d) Left ventricle.

- 22 The blood that reaches the brain cells leaves the heart from the .....  
 (a) left atrium (b) right atrium (c) left ventricle (d) right ventricle
- 23 What is the function of aorta artery?  
 (a) Transporting the oxygenated blood from the heart to all the body parts.  
 (b) Transporting the oxygenated blood from the two lungs to the heart.  
 (c) Transporting the deoxygenated blood from the heart to the two lungs.  
 (d) Transporting the deoxygenated blood from all the body parts to the heart.
- 24 Which of the following blood vessels carries deoxygenated blood from the right ventricle to the lungs?  
 (a) Pulmonary artery. (b) Aorta. (c) Pulmonary vein. (d) Vena cava.
- 25 Which of the following happens during the physical exercise?  
 (a) Decreasing the rate of perspiration.  
 (b) Supplying the muscles with carbon dioxide.  
 (c) Decreasing the rate of anaerobic respiration.  
 (d) Increasing the numbers of ADP molecules in muscles.

- 26 In the opposite figure, what do the blood vessels from (1) : (3) represent, respectively?

- (a) Vein / Artery / Blood capillaries.  
 (b) Artery / Blood capillaries / Vein.  
 (c) Blood capillaries / Artery / Vein.  
 (d) Artery / Vein / Blood capillaries.



- 27 The following cases illustrate some of the blood pathways in the human body:

- (1) From the left ventricle to kidney cells.  
 (2) From the brain cells to the right atrium.  
 (3) From the left ventricle to brain cells.  
 (4) From the right ventricle to the lungs.

Which two pathways contain deoxygenated blood?

- (a) (1) & (3). (b) (2) & (4). (c) (1) & (2). (d) (3) & (4).

- 28 Which of the following blood vessels carries oxygenated blood from the lungs to the heart?

- (a) Pulmonary artery. (b) Aorta. (c) Pulmonary vein. (d) Vena cava.



- 29 Which of the following body systems integrates with the circulatory system to transport oxygen to all the body parts?

(a) Digestive system. (b) Respiratory system.  
(c) Excretory system. (d) Skeletal system.

- 30 The circulatory system cooperates with the excretory system in .....

(a) transporting digested food (b) increasing the heartbeats  
(c) getting rid of metabolic wastes (d) regulating the breathing rate

- 31 Which of the following blood vessels transport(s) blood from all the body parts to the heart?

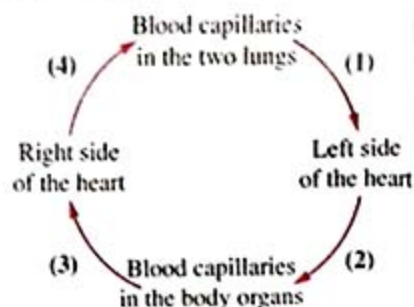
(a) Pulmonary artery. (b) Aorta. (c) Pulmonary veins. (d) Venae cavae.

- 32 In which blood vessels does the gas exchange take place between blood and body cells?

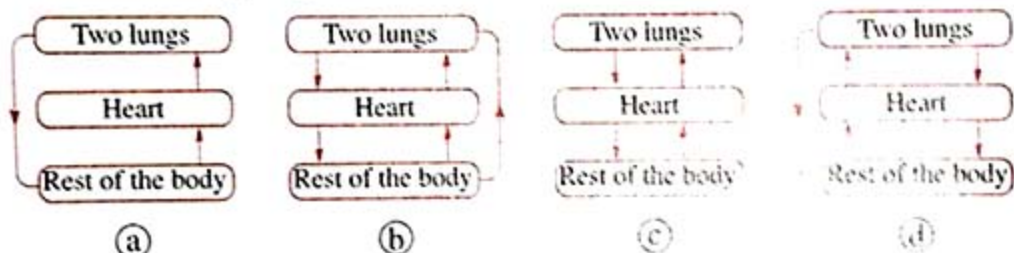
(a) Arteries. (b) Veins. (c) Blood capillaries. (d) All blood vessels.

- 33 The opposite diagram shows a simple pathway of blood within the body, which two pathways contain the highest percentage of oxygen gas in blood?

(a) (1) & (2). (b) (2) & (3).  
(c) (3) & (4). (d) (4) & (1).

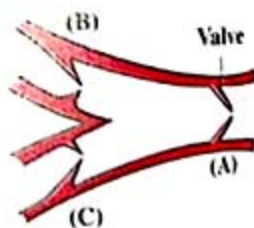


- 34 Which of the following diagrams illustrates the blood circulation in the human body?



- 35 The following figure shows the meeting of two veins (B) & (C) together, which of the following shows the direction of venous blood?

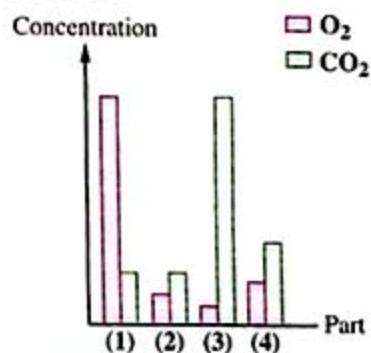
(a) (C) → (A) and (A) → (B).  
(b) (A) → (B) and (A) → (C).  
(c) (A) → (C) and (B) → (A).  
(d) (C) → (A) and (B) → (A).



- 36 Which of the following is correct about systolic pressure?
- It represents the lower value of blood pressure.
  - It results from the relaxation of heart.
  - Its normal value is 120 mm Hg.
  - It represents the maximum pressure exerted by the heart on veins.
- 37 Which of the following is correct about diastolic pressure?
- It represents the lower value of blood pressure.
  - It results from the contraction of heart to pump the blood.
  - Its normal value is 120 mm Hg.
  - It represents the maximum pressure exerted by the heart on arteries.
- 38 Which of the following causes high blood pressure in human?
- Decreased blood density.
  - Decreased blood viscosity.
  - Dehydration.
  - Increased vascular elasticity.
- 39 A patient with arteriosclerosis suffers from .....
- low blood pressure
  - high blood pressure
  - decreased red blood cell count
  - renal nerve dysfunction
- 40 Which of the following systolic blood pressure values could indicate that a patient has arteriosclerosis?
- 60 mm Hg.
  - 80 mm Hg.
  - 120 mm Hg.
  - 150 mm Hg.

- 41 What substance is used in the most common blood pressure device?
- Copper.
  - Gold.
  - Silver.
  - Mercury.

- 42 \* The opposite graph represents the concentration of  $\text{CO}_2$  and  $\text{O}_2$  gases in blood in different body parts numerated from (1) : (4), which of the following represents aorta?



- (1).
  - (2).
  - (3).
  - (4).
- 43 \* What is the similarity between the pulmonary artery and the peripheral veins?
- The transport of oxygenated blood.
  - The transport of deoxygenated blood.
  - Having the same internal width.
  - Having the same blood pressure value.



- 44 \* A patient with hemolytic anemia (continuous breakdown of red blood cells) suffers from .....
- (a) low blood pressure and high blood viscosity
  - (b) high blood pressure and low blood viscosity
  - (c) low blood pressure and low blood viscosity
  - (d) high blood pressure and high blood viscosity

## Second Miscellaneous Questions

1 Write the scientific term for each of the following statements:

- (a) Tissue that is responsible for transporting water and mineral salts absorbed from the soil to the leaves.
- (b) Tissue that is responsible for transporting the products of photosynthesis from the leaves to all the plant parts.

2 Give reasons for:

- (a) The walls of the xylem vessels are supported by lignin.
- (b) Hydrogen bonds that bind water molecules together play a role in the ascent of water in plants.
- (c) Transpiration has an important role in plants.
- (d) Water ascends against gravity despite the absence of any pump inside the plant.
- (e) Companion cells play an important role in the transport process in plants.
- (f) The root cells obtain their food, although they aren't exposed to light.
- (g) Blood is a viscous fluid in normal cases.
- (h) Both breathing rate and heart rate increase during physical exercise.

3 What happens in each of the following cases:

- (a) The closure of stomata by a waxy layer, "concerning: the transport rate within the xylem tissue".
- (b) The absence of valves from veins, "concerning: the blood flow".
- (c) The occurrence of dehydration, "concerning: the blood pressure".

4 Compare between each of the following:

- (a) Xylem tissue and phloem tissue, "in terms of: structure – function".
- (b) Systemic circulation and pulmonary circulation, "in terms of: the pathway of blood".
- (c) Arteries and veins, "in terms of: their function".
- (d) Systolic and diastolic pressures, "in terms of: definition – value".

5 A patient with high blood pressure is unresponsive to known blood pressure medications. In the light of what you have studied, what technique can be used to treat this patient? What is its idea of work?

6 Through your study, what is the technique that is used in studying the movement of fluids in plants precisely?

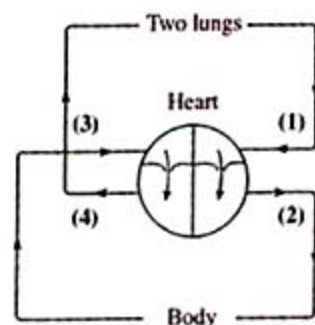
## Questions that measure **high levels of thinking**

Answered in detail

**Choose the correct answer:**

- 1 When air bubbles leak into the xylem vessels, which forces are the most affected?
- Adhesion only.
  - Pulling and adhesion forces.
  - Cohesion only.
  - Cohesion and pulling forces.

- 2 The opposite figure illustrates a simple diagram for the blood pathway in human body within blood vessels from (1) : (4), which blood vessel has the highest blood pressure?



- (1).
- (2).
- (3).
- (4).



# Questions ?

Unit Three | Lesson 2

Part  
2

Answered

First

## Multiple Choice Questions



Interactive  
test

Questions signed by \* are answered in detail.

### Cellular respiration and obtaining energy

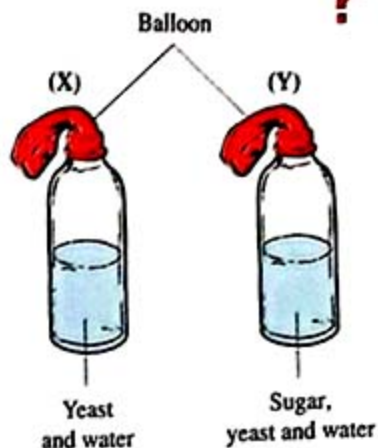
- 1 Which of the following must be present in abundance to relieve the muscle fatigue?  
 (a) Glucose, (b) Oxygen, (c) Glycogen, (d) ADP

- 2 From the opposite equation:  $(X) + 6O_2 \xrightarrow{(Y)} 6CO_2 + 6H_2O + (Z)$   
 Which choice in the following table is correct about (X), (Y) & (Z)?

|     | (X)     | (Y)     | (Z)     |
|-----|---------|---------|---------|
| (a) | Enzymes | Energy  | Glucose |
| (b) | Glucose | Enzymes | Energy  |
| (c) | Energy  | Glucose | Enzymes |
| (d) | Glucose | Energy  | Enzymes |

- 3 How many ATP molecules are resulted from the fermentation of the products of glycolysis of one glucose molecule in a muscle cell?  
 (a) 2 (b) 18 (c) 36 (d) 38
- 4 What is the ratio of the energy released from the aerobic respiration to that of the anaerobic respiration for one glucose molecule?  
 (a) 1 : 1 (b) 18 : 1 (c) 36 : 1 (d) 9 : 1
- 5 Which of the following organelles is responsible for the production of energy?  
 (a) Chloroplast, (b) Mitochondrion,  
 (c) Sap vacuole, (d) Nucleus.
- 6 The process of cellular respiration in the cells of a living organism begins with .....  
 (a) alcoholic fermentation  
 (b) lactic acid fermentation  
 (c) glycolysis  
 (d) glucose oxidation

- 7 The opposite figure illustrates two bottles, each with a balloon at its mouth closed and placed inside a warm room, what happens for the two balloons (X) and (Y) after 24 hours, respectively?



- (a) Inflates / Inflates.  
(b) Inflates / Unchanged.  
(c) Unchanged / Inflates.  
(d) Unchanged / Unchanged.

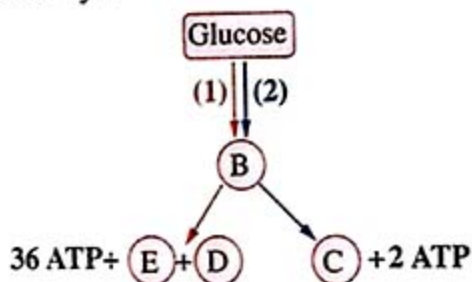
- 8 Which of the following doesn't agree with the occurrence of anaerobic respiration in a muscle?

- (a) The increase of lactic acid in the muscle.  
(b) The depletion of oxygen that reaches the muscle.  
(c) The production of a large amount of ATP molecules.  
(d) The muscle fatigue.

- 9 The following diagram shows the cellular respiration inside a muscle cell, study it then answer:

- (1) Which of the following represents (1) and (2), respectively?

- (a) Aerobic respiration / Anaerobic respiration.  
(b) Glycolysis / Aerobic respiration.  
(c) Anaerobic respiration / Aerobic respiration.  
(d) Anaerobic respiration / Glycolysis.



- (2) Which letter in the diagram refers to lactic acid?

- (a) B                      (b) C                      (c) D                      (d) E

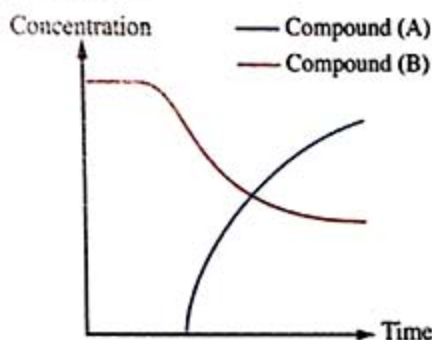
- 10 From the opposite reaction:  $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + 2ATP$

Where does this reaction take place?

- (a) Companion cells.                      (b) Yeast fungus.  
(c) Muscle cells.                      (d) Tracheids.

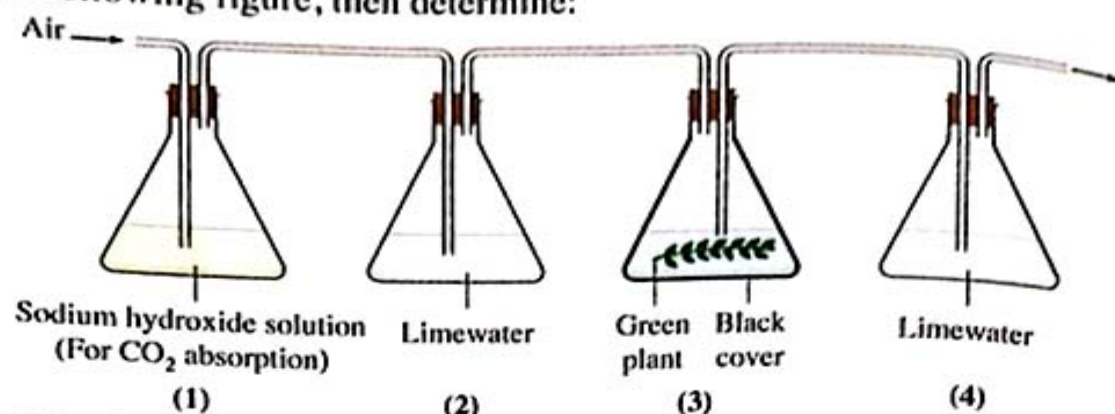
- 11 The opposite graph represents the concentration of two types of compounds in the thigh muscles, during performing vigorous exercises, which of the following expresses (A) and (B) compounds, respectively?

- (a) Glucose / ADP                      (b) Lactic acid / Glucose.  
(c) Ethanol / ATP                      (d)  $CO_2$  / Lactic acid.





- 12 Study the following figure, then determine:

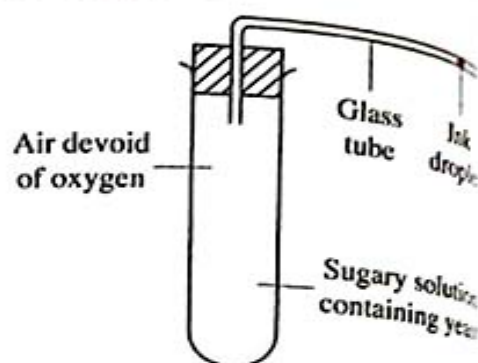


Which of the following choices shows what happens to the limewater in flasks no. (2) and (4) respectively after pumping air?

- (a) Becomes turbid / Becomes turbid. (b) Becomes turbid / Remains clear.  
(c) Remains clear / Becomes turbid. (d) Remains clear / Remains clear.

- 13 \* The opposite figure illustrates an experiment used in the detection of respiration in yeast, what happens to the ink droplet?

- (a) It moves quickly inwards.  
(b) It moves slowly inwards.  
(c) It moves outwards.  
(d) It remains constant.



### Energy and chemical reactions

- 14 In a chemical reaction, if the heat content of products is lower than that of reactants, thus the reaction .....

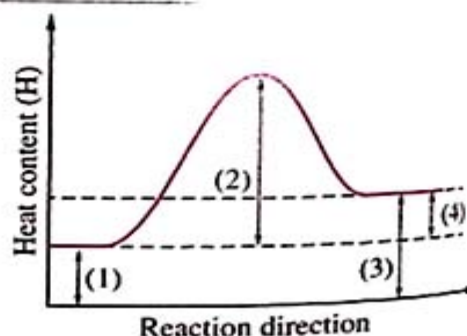
- (a) is endothermic (b) is exothermic  
(c) has  $\Delta H$  value with a positive sign (d) has  $\Delta H$  value = zero

- 15 In the opposite reaction:  $2\text{NO}_{(g)} + \text{O}_{2(g)} \longrightarrow 2\text{NO}_{2(g)} + 112 \text{ kJ}$ ,  $\Delta H$  has .....

- (a) a negative sign, because the reaction is endothermic  
(b) a positive sign, because the reaction is endothermic  
(c) a negative sign, because the reaction is exothermic  
(d) a positive sign, because the reaction is exothermic

- 16 In the opposite graph, what is the number of the part which indicates each of the change in heat content of reaction and the activation energy, respectively?

- (a) (1) / (3) (b) (2) / (4)  
(c) (3) / (4) (d) (4) / (2)



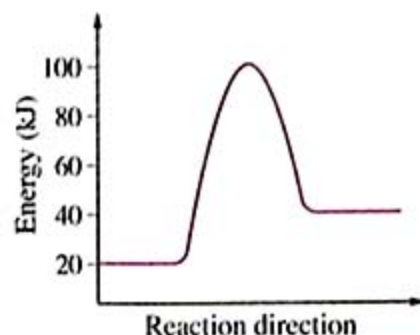
- 17 From the opposite thermochemical equation:  $2C_{(s)} + 2H_{2(g)} + 52.3 \text{ kJ} \longrightarrow C_2H_{4(g)}$   
We conclude that  $\Delta H$  has .....

(a) a negative sign, because the reaction is endothermic  
(b) a positive sign, because the reaction is endothermic  
(c) a negative sign, because the reaction is exothermic  
(d) a positive sign, because the reaction is exothermic

- 18 What is the process in which the temperature of surrounding medium decreases?  
And what is the suitable sign of energy?

(a) Endothermic process / Negative. (b) Endothermic process / Positive.  
(c) Exothermic process / Negative. (d) Exothermic process / Positive.

- 19 The opposite graph shows the change in energy within a chemical reaction, which of the following represents each of the reaction type and its  $\Delta H$  value?



(a) Endothermic / +20 kJ  
(b) Exothermic / +20 kJ  
(c) Endothermic / -20 kJ  
(d) Exothermic / -20 kJ

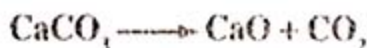
- 20 In the process represented by the equation:  $O_2 \xrightarrow{UV} O + O$

Which of the following statements represents this process?

(a) Breakage of bonds takes place and the process is endothermic.  
(b) Breakage of bonds takes place and the process is exothermic.  
(c) Formation of bonds takes place and the process is exothermic.  
(d) Formation of bonds takes place and the process is endothermic.

- 21 From the following equation, what is the mass of calcium oxide produced from the thermal decomposition of 10 g of calcium carbonate?

[Ca = 40, C = 12, O = 16]



(a) 178 g (b) 56 g (c) 17.8 g (d) 5.6 g

- 22 The mass of carbon in 2 mol of  $CaCO_3$  equals .....

[C = 12]

(a) 24 g (b) 12 g (c) 6 g (d) 0.48 g

- 23 The mass of 0.25 mol of sodium carbonate  $Na_2CO_3$  equals .....

[Na = 23, C = 12, O = 16]

(a) 23 g (b) 26.5 g (c) 53 g (d) 106 g



- 24 Which of the following samples has the greatest mass?

[N = 14, H = 1, O = 16]

- (a) 1 mol of  $N_2H_4$       (b) 2 mol of NO      (c) 3 mol of  $NH_3$       (d) 2.5 mol of  $N_2$

- 25 Which of the following pairs include exothermic and endothermic reactions, respectively?

- (a) Photosynthesis / Transporting materials through membranes.  
 (b) Cellular respiration / Photosynthesis.  
 (c) Cell division / Cellular respiration.      (d) Photosynthesis / Cell division.

- 26 From the reaction:  $2Al + 6HCl \longrightarrow Al_2Cl_6 + 3H_2$

The mass of hydrogen produced from the reaction of 25 g of aluminum with excess of hydrochloric acid equals .....

[Al = 27, H = 1]

- (a) 0.41 g      (b) 1.2 g      (c) 1.8 g      (d) 2.8 g

- 27 The mass of 2 mol of ozone  $O_3$  equals .....

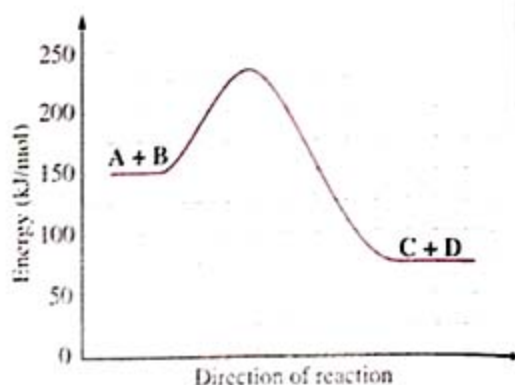
(Knowing that: O = 16)

- (a) the mass of 1 mol of  $O_2$   
 (b) the mass of 2 mol of  $O_2$   
 (c) one and half times the mass of 2 mol of  $O_2$   
 (d) double the mass of 2 mol of  $O_2$

- 28 From the opposite graph, what is the value of the change in heat content of the following reaction

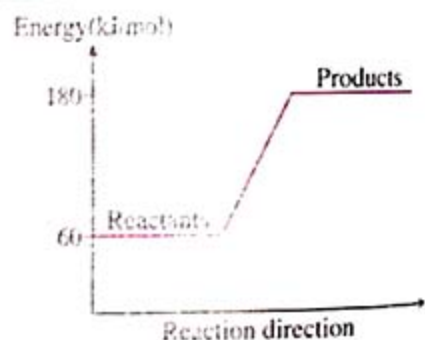


- (a) -225 kJ/mol  
 (b) -75 kJ/mol  
 (c) +75 kJ/mol  
 (d) +225 kJ/mol

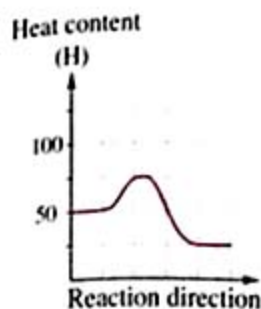


- 29 From the opposite graph, what is the value of change in heat content within the occurred reaction?

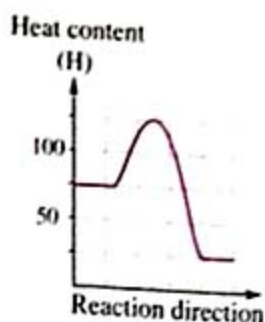
- (a) +120 kJ/mol  
 (b) -120 kJ/mol  
 (c) +240 kJ/mol  
 (d) -240 kJ/mol



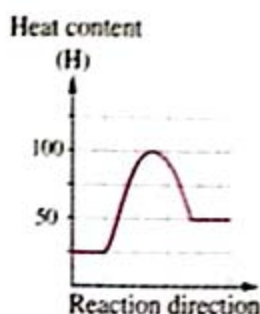
- 30 Which of the following graphs expresses an exothermic reaction that has the least  $\Delta H$  value?



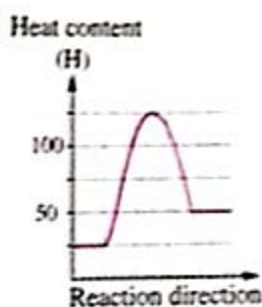
(a)



(b)



(c)



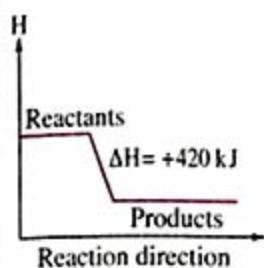
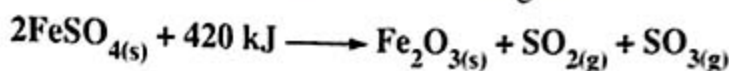
(d)

- 31 Which of the following reactions can be represented by the opposite graph?

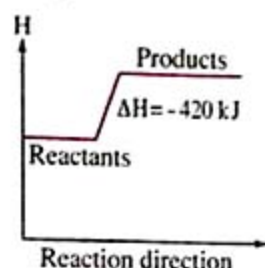
- (a)  $A + B \longrightarrow C + D + 50 \text{ kJ}$   
 (b)  $A + B + 50 \text{ kJ} \longrightarrow C + D$   
 (c)  $A + B - 50 \text{ kJ} \longrightarrow C + D$   
 (d)  $A + B \longrightarrow C + D, \Delta H = -50 \text{ kJ}$



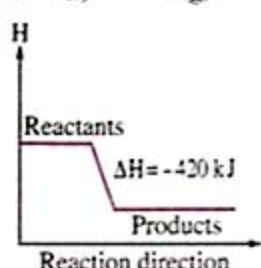
- 32 Which of the following graphs represents the following reaction?



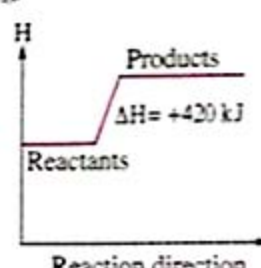
(a)



(b)



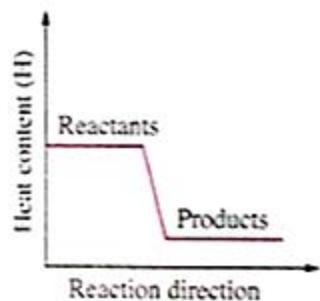
(c)



(d)

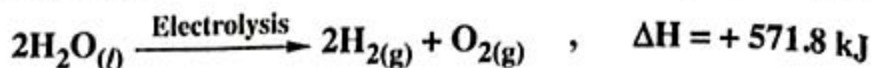
- 33 Which of the following statements describes correctly the chemical reaction which is represented by the opposite graph?

- (a) The sum of heat contents of reactants is higher than the sum of heat contents of products.  
 (b) The energy required to break the bonds in the reactant molecules equals the released energy during the formation of the bonds in the product molecules.  
 (c) The sum of heat contents of products is higher than the sum of heat contents of reactants.  
 (d) The stored energy in the reactant molecules is less than the stored energy in the product molecules.



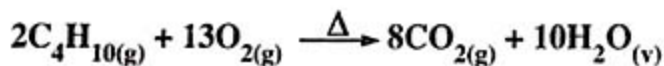


- 34 The following equation represents the dissociation reaction (electrolysis) of water:



From this equation, it is clear that the process of forming a mole of water from its primary elements in their standard conditions is an .....

- (a) exothermic process which releases an amount of heat equals 571.8 kJ/mol  
(b) exothermic process which releases an amount of heat equals 285.9 kJ/mol  
(c) endothermic process which absorbs an amount of heat equals 571.8 kJ/mol  
(d) endothermic process which absorbs an amount of heat equals 285.9 kJ/mol
- 35 From the reaction:  $\text{CH}_{4(g)} + 2\text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(v)}$  ,  $\Delta H = - 890 \text{ kJ/mol}$   
The amount of heat released from the combustion of 3 mol of methane gas equals .....
- (a) 2670 kJ                      (b) 890 kJ                      (c) 296.6 kJ                      (d) 1780 kJ
- 36 When dissolving ammonium chloride in water, the temperature of the solution decreased, which means that this process is .....
- (a) endothermic, with a positive  $\Delta H$  value                      (b) endothermic, with a negative  $\Delta H$  value  
(c) exothermic, with a negative  $\Delta H$  value                      (d) exothermic, with a positive  $\Delta H$  value
- 37 Butane burns according to the following equation:



What is the number of moles of carbon dioxide gas produced from burning 3 mol of butane gas  $\text{C}_4\text{H}_{10}$ ?

- (a) 4 mol                      (b) 8 mol                      (c) 12 mol                      (d) 24 mol
- 38 \* From the opposite equation:  $\text{H}_2\text{O}_{(l)} \longrightarrow \text{H}_2\text{O}_{(v)}$  ,  $\Delta H = +44 \text{ kJ/mol}$   
We conclude that the heat content of water vapor is ..... the heat content of liquid water.
- (a) less than                      (b) equal to                      (c) higher than                      (d) half
- 39 \* What is the molar mass in grams of glucose?
- (Knowing that the atomic mass of: O = 16, C = 12, H = 1)
- (a) 16                      (b) 80                      (c) 100                      (d) 180

## Second Miscellaneous Questions

### 1 Write the scientific term for each of the following statements:

- (a) A series of chemical reactions in which the latent chemical energy in glucose is released and stored it as a usable energy in the form of ATP molecules.
- (b) The power station in the cell.
- (c) The process by which a living organism obtains energy from the glucose molecule in the absence or lack of oxygen.
- (d) Energy is neither destroyed nor created, but transformed from one form to another.
- (e) The amount of a substance whose mass in gram is equivalent to its molecular mass.
- (f) \* The sum of masses of the reactants is equal to the sum of masses of the products.  
\* Mass is neither destroyed nor created within chemical reaction, but transforms from one form to another.
- (g) The amount of chemical energy stored in one mole of a substance.
- (h) The difference between the sum of heat contents of the products ( $H_p$ ) and the sum of heat contents of the reactants ( $H_R$ ).
- (i) A chemical reaction in which the sum of heat contents of the reactants is less than that of the products.
- (j) A chemical reaction in which the sum of heat contents of the products is less than that of the reactants.

### 2 Give reasons for:

- (a) Cellular respiration type depends on the available quantity of oxygen in cells.
- (b) The lack of oxygen in cells doesn't affect the life of some living organisms as yeast.
- (c) The law of conservation of energy is fulfilled in the process of aerobic cellular respiration.
- (d) Aerobic cellular respiration is an example for the exothermic reactions and the photosynthesis process is an example for the endothermic reactions.
- (e) Releasing an energy in a form of heat as a product of chemical reaction doesn't mean losing a mass.
- (f) The change in heat content ( $\Delta H$ ) of exothermic reactions has a negative sign.
- (g) The change in heat content ( $\Delta H$ ) of endothermic reactions has a positive sign.

### 3 What happens when muscle cells are exposed to a lack or absence of oxygen?

### 4 Compare between each of the following:

- (a) Acidic fermentation and alcoholic fermentation, "in terms of: location – products – equation of the reaction".
- (b) Exothermic and endothermic reactions, "in terms of: definition – the relation between the stored energy in products and reactants".



5 What is meant by the change in heat content ( $\Delta H$ ) of a chemical reaction is equal to  $-383.5 \text{ kJ/mol}$ ?

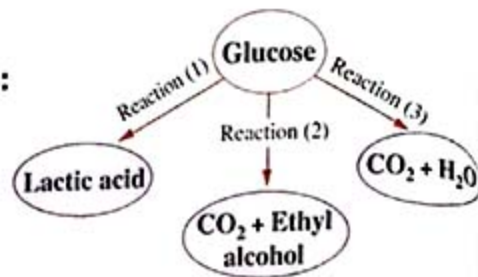
6 Illustrate with balanced chemical equations, determining the type of reaction (exothermic or endothermic):

- Aerobic cellular respiration.
- Reaction of sodium hydroxide solution with hydrochloric acid.
- The decomposition reaction of solid potassium chlorate.

7 From the opposite diagram:

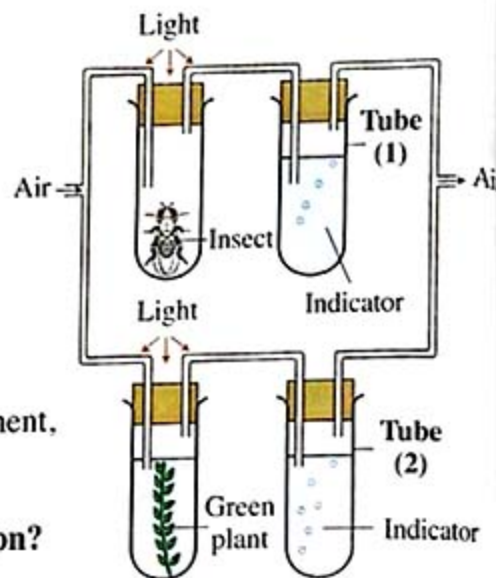
Which of the reactions from no. (1) : (3) represents:

- Aerobic respiration.
- Anaerobic respiration in muscles.
- Anaerobic respiration in yeast.



8 Study well the opposite apparatus that represents an experiment to compare between the amount of carbon dioxide resulted from the respiration of an insect and an aquatic green plant, then answer:

- What is the name of the substance that is used in detecting CO<sub>2</sub>?
- After one hour from the beginning of the experiment, the indicator didn't change in tube no. (2), but it changed in tube no. (1). What is your explanation?
- What do you expect to happen, on putting the apparatus in darkness for a long period of time?



9 In a laboratory experiment, a solution of mercury oxide was placed in a test tube and heated until it thermally decomposed; producing mercury and oxygen gas evolved.

What is the type of reaction concerning the change in heat content?

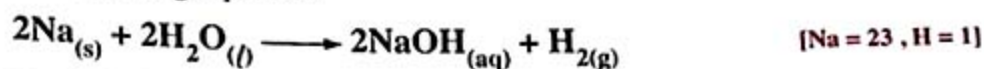
10 What is the molar mass in grams of sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), knowing that the atomic mass of (H = 1, S = 32, O = 16)?

- 11 Ammonia gas is burnt according to the following equation:



How many moles of water vapor are produced from burning 1 mol of ammonia gas?

- 12 Calculate the mass of hydrogen gas produced from reaction of 0.23 g of sodium with water according to the following equation:



- 13 In the opposite reaction:  $\text{CH}_{4(g)} + 4\text{Cl}_{2(g)} \longrightarrow \text{CCl}_{4(l)} + 4\text{HCl}_{(g)}$

What is the mass of  $\text{CCl}_4$  which is produced from the reaction of 5.14 g of methane gas with excess of chlorine gas?

[C = 12, H = 1, Cl = 35.5]

### Questions that measure high levels of thinking

Answered in detail

Choose the correct answer:

- 1 What is the mass of ethanol produced from the fermentation of one mole of glucose? (Knowing that the mass number of: H = 1, C = 12, O = 16)

(a) 46 g                      (b) 80 g                      (c) 92 g                      (d) 120 g

- 2 Which choice in the following table represents equal masses of each of oxygen and hydrogen?

[O = 16, H = 1]

|     | Oxygen             | Hydrogen            |
|-----|--------------------|---------------------|
| (a) | 1 mol of atoms     | 32 mol of molecules |
| (b) | 1 mol of molecules | 8 mol of atoms      |
| (c) | 1 mol of atoms     | 8 mol of molecules  |
| (d) | 1 mol of molecules | 16 mol of atoms     |

- 3 Ammonium nitrate is ionized according to the following equation:



What is the number of moles of oxygen atoms found in ions produced from the ionization of 240 g of  $\text{NH}_4\text{NO}_3$ ?

[N = 14, O = 16, H = 1]

(a) 3 mol                      (b) 6 mol                      (c) 9 mol                      (d) 27 mol



# Questions ?

## Unit Three | Lesson 3

Answered

First

### Multiple Choice Questions

Questions signed by \* are answered in detail.



Interactive  
test

#### Metabolism

- 1 Which of the following is considered from the gaseous waste products produced from cellular respiration?  
(a) Oxygen. (b) Hydrogen. (c) Nitrogen. (d) Carbon dioxide.
- 2 Which of the following is produced from the breakdown of excess amino acids in the liver?  
(a)  $\text{CO}_2$  (b) Ammonia. (c) Bilirubin. (d) Water.
- 3 Which of the following is considered a harmful metabolic byproduct resulting from the digestion of a piece of meat eaten by a person?  
(a) Nitrogen. (b) Amino acids. (c) Ammonia. (d)  $\text{CO}_2$
- 4 Which of the following is not a metabolic waste product?  
(a)  $\text{CO}_2$  (b) Nitrogen. (c) Water. (d) Urea.
- 5 Which of the following is not from the importance of metabolism in the body?  
(a) Obtaining the energy needed for the body.  
(b) Building the essential biological molecules.  
(c) Obtaining food. (d) Resisting the infection.
- 6 Which of the following explains the relationship between excretion and homeostasis in the body?  
(a) Expelling out of excess water only.  
(b) Maintaining the internal environment of the body constant.  
(c) Energy production. (d) Oxygen transport.

#### Excretory organs in human

- 7 Which of the following substances has multiple ways to be eliminated by the body?  
(a) Excess water. (b)  $\text{CO}_2$  (c) Drugs. (d) Ammonia.
- 8 Which of the following excretory substances is/are eliminated by the body through the kidneys, lungs, and skin?  
(a)  $\text{CO}_2$  (b) Water. (c) Urea. (d) Salts.

- 9 What is the primary function of the kidneys in human?
- Eliminating salts only.
  - Eliminating carbon dioxide and toxins.
  - Regulating the ionic balance and eliminating toxic substances.
  - Eliminating excess water only.
- 10 Which of the following statements about the kidney in human is incorrect?
- It is approximately the size of a fist.
  - It is responsible for the urine extraction.
  - It resembles a kidney bean in shape.
  - It is directly connected to the urinary bladder.
- 11 Which of the following is not a major component of urine?
- Glucose.
  - Excess water.
  - Excess salts.
  - Urea.
- 12 All of the following ions are needed by the body to regulate osmotic pressure inside and outside cells, except .....
- sodium
  - potassium
  - lead
  - chloride
- 13 All of the following are reabsorbed from the kidney nephrons back into the bloodstream, except .....
- glucose
  - urea
  - water
  - potassium ions
- 14 What is the consequence of a person not drinking enough water?
- The osmotic pressure of blood increases.
  - The filtration process stops.
  - The urination times increase.
  - The ions concentration in blood decreases.
- 15 \* Which choice in the following table indicates an increase in the percentage of water found in the urine of a healthy person?

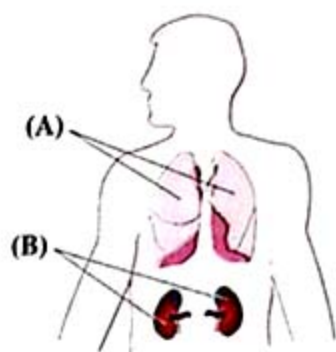
|     | Water amount that the person drinks | The exerted activity | Temperature surrounding the body |
|-----|-------------------------------------|----------------------|----------------------------------|
| (a) | Large                               | Low                  | Low                              |
| (b) | Small                               | High                 | Low                              |
| (c) | Large                               | Low                  | High                             |
| (d) | Small                               | High                 | High                             |

- 16 When salts in the blood increase, the kidneys respond by .....
- increasing the sweat secretion
  - increasing the water reabsorption
  - increasing water excretion
  - storing excess salts



- 17 If the kidneys fail to function, the first thing affected is the .....  
 (a) oxygen level (b) waste products percentage in blood  
 (c) blood cell count (d) hormone production

- 18 The opposite figure shows some of the body's organs that participate in the excretion process, what substance is excreted by organ (A) that organ (B) does not?



- (a)  $H_2O$   
 (b)  $CO_2$   
 (c) Bilirubin.  
 (d) Urea.

- 19 \* In a healthy person, as the temperature increases, the rate of urination .....  
 (a) decreases (b) increases  
 (c) isn't affected (d) increases then decreases

- 20 All of the following are components of sweat, except .....  
 (a) ammonia (b) urea (c) water (d) mineral salts

- 21 The amount of toxic substances in the body increases when .....  
 (a) the anaerobic respiration rate decreases  
 (b) the metabolic waste products accumulate  
 (c) the sweating rate increases  
 (d) the concentration of mineral ions decreases

- 22 Which of the following is from the functions of the epidermis of human skin?  
 (a) Moderating the body temperature.  
 (b) Extraction of nitrogenous wastes from blood.  
 (c) Sweat production.  
 (d) Preventing the bacterial invasion to the body.

- 23 Which of the following organs can't excrete water from the body?  
 (a) Skin. (b) Lungs. (c) Kidneys. (d) Liver.

- 24 What is the reason for the skin's ability to maintain the body temperature stable?  
 (a) Fewer blood capillaries around the sweat glands.  
 (b) The accumulation of wastes on pores.  
 (c) Fewer wastes in sweat.  
 (d) The excretion of water in the form of a liquid then evaporates.

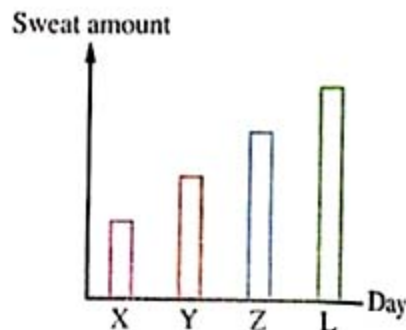
- 25 A person sits in a room at a temperature of  $40^{\circ}\text{C}$  for 30 minutes. What do you expect to happen for his body surface temperature and sweating rate, respectively?
- (a) Decreases / Decreases. (b) Decreases / Increases.  
(c) Increases / Decreases. (d) Increases / Increases.

- 26 Which of the choices in the following table represents the body's response when feeling very cold?

|     | Sweating  | Urination |
|-----|-----------|-----------|
| (a) | Increases | Increases |
| (b) | Increases | Decreases |
| (c) | Decreases | Increases |
| (d) | Decreases | Decreases |

- 27 Which of the following can be observed when examining equal amounts of urine and sweat from the same person?
- (a) Equal salt content in both. (b) Equal water content in both.  
(c) Higher percentage of nitrogenous wastes in urine.  
(d) Higher percentage of nitrogenous wastes in sweat.

- 28 \* The opposite graph shows the amount of sweat produced by the body during four days in the four seasons. Which of the following choices expresses the sweat amount after drinking one liter of water immediately during the daytime of a day in July?



- (a) X (b) Y  
(c) Z (d) L
- 29 \* What is the main function of sweat excretion?
- (a) Reducing the excess body heat. (b) Getting rid of excess salts.  
(c) Excretion of excess water. (d) Expelling out of nitrogenous wastes.
- 30 \* From the following table, which samples were collected on a cold day?

|     | Volume of urine sample ( $\text{cm}^3$ ) | Volume of sweat sample ( $\text{cm}^3$ ) |
|-----|------------------------------------------|------------------------------------------|
| (a) | 0.8                                      | 1.5                                      |
| (b) | 0.8                                      | 1.2                                      |
| (c) | 1.5                                      | 0.8                                      |
| (d) | 1.2                                      | 1.1                                      |

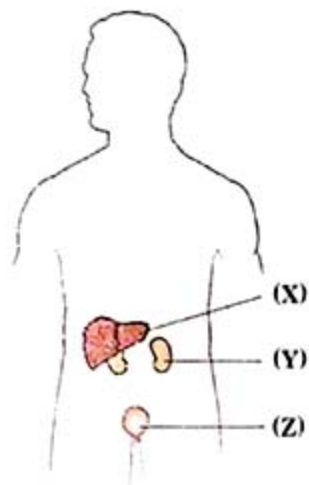


- 31 \* The following table shows the amount of water and salts lost from the body through the kidneys and skin on a hot day and a cold day:

| Day  | The amount of water lost (cm <sup>3</sup> ) from |      | The amount of salts lost (g) from |      |
|------|--------------------------------------------------|------|-----------------------------------|------|
|      | Kidneys                                          | Skin | Kidneys                           | Skin |
| Hot  | 0.4                                              | 2.3  | 14.4                              | 5.8  |
| Cold | 1.8                                              | 0.1  | 20.2                              | 0.1  |

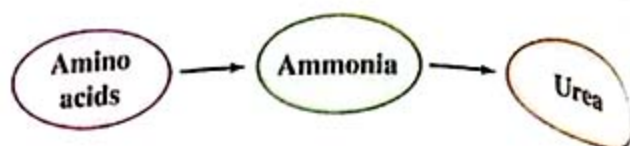
Which of the following can be deduced after studying the table?

- (a) The amount of water lost by the kidneys on a cold day is less than on a hot day.  
 (b) The kidneys lose more salts on a hot day than on a cold day.  
 (c) The amount of salts lost from the body is approximately the same on both days.  
 (d) The kidneys do not lose any amount of water on a hot day.
- 32 Which of the following layers of skin include(s) sweat glands and hair follicles?  
 (a) Epidermis. (b) Dermis.  
 (c) Epidermis and dermis. (d) Hypodermis.
- 33 Which of the following plays a role in regulating the body temperature?  
 (a) Sweat glands only. (b) Hair follicles only.  
 (c) Sweat glands and blood vessels. (d) Hair follicles and blood vessels.
- 34 Which of the following layers of skin acts as a thermal insulator?  
 (a) Epidermis. (b) Basal layer of epidermis.  
 (c) Dermis. (d) Hypodermis.
- 35 The opposite figure illustrates some of the excretory organs in human:



- (1) Which of the following represents one of the functions of organ (Y) in a healthy person?  
 (a) Getting rid of the body proteins.  
 (b) Complete removal of salts from the body.  
 (c) Reabsorption of glucose from the blood.  
 (d) Regulating the body's water and salt contents.
- (2) What are the two organs responsible for the formation and elimination of urea from blood, respectively?  
 (a) (X) / (Y). (b) (Y) / (X). (c) (Y) / (Z). (d) (Z) / (X).

- 36 Using the opposite diagram, where does the shown vital process take place?



- (a) Skin. (b) Lungs.  
(c) Kidneys. (d) Liver.

- 37 Which of the following shows the correct pathway for the body to eliminate urea?

- (a) Liver → Kidney → Urethra → Urinary bladder → Ureter.  
(b) Liver → Urethra → Kidney → Ureter → Urinary bladder.  
(c) Liver → Kidney → Ureter → Urinary bladder → Urethra.  
(d) Liver → Ureter → Kidney → Urinary bladder → Urethra.

- 38 Which of the following excretory organs is/are called the treatment plant of wastes?

- (a) Skin. (b) Kidney. (c) Liver. (d) Lungs.

- 39 Which of the following statements is not applied to urea?

- (a) It is formed by the liver from the metabolism of proteins.  
(b) It is excreted by the kidneys with urine.  
(c) It is excreted outside the body with feces.  
(d) It accumulates in the blood when the kidneys fail to function.

- 40 When examining a urine sample of a healthy person who ate a meal containing large amounts of meat at the night before the sample was taken, which of the following will be present in the sample in a higher proportion?

- (a) Protein. (b) Amino acids. (c) Urea. (d) Ammonia.

- 41 \* Which human body organ(s) play(s) an important role in maintaining the balance of amino acids percentage in blood?

- (a) Lungs. (b) Skin. (c) Kidneys. (d) Liver.

- 42 Bilirubin is produced from the breakdown of .....

- (a) enzymes (b) amino acids (c) white blood cells (d) red blood cells

- 43 Which of the following is/are not from the contents of bile?

- (a) Hemoglobin. (b) Bilirubin. (c) Cholesterol. (d) Some pigments.

- 44 Which of the following excretory organs is/are responsible for treating toxins and foreign substances?

- (a) Skin. (b) Liver. (c) Kidneys. (d) Lungs.



### Technological applications on the excretion process

- 45 \* Which of the following substances would be expected to be found at a higher level than normal level in a blood sample from a patient with kidney failure?  
 (a) Glucose. (b) Ammonia. (c) Urea. (d) Salts.
- 46 The operation of the artificial kidney depends on.....  
 (a) biological and physical principles (b) biological and chemical principles  
 (c) physical principle only (d) biological principle only
- 47 Which of the following substances does/do not pass through the semi-permeable membrane of the bio-artificial kidney?  
 (a) Proteins. (b) Water. (c) Mineral salts. (d) Urea.
- 48 The process of sweating is considered an application of the concept of .....  
 (a) internal balance only (b) thermal equilibrium only  
 (c) filtration (d) thermal equilibrium and evaporation

### Nutrient cycles in the biosphere

- 49 \* In which stage of the carbon cycle in nature does the transfer of organic carbon from one organism to another occur?  
 (a) Plant respiration. (b) Photosynthesis.  
 (c) Animal feeding. (d) Decomposition of organic matter.
- 50 \* Which of the following is not from the biological processes which contribute to increasing the percentage of  $\text{CO}_2$  in atmosphere?  
 (a) Plant respiration. (b) Decomposition of organic matter.  
 (c) Decomposers respiration. (d) Fossil fuel combustion.
- 51 Which of the following living organisms contribute to decreasing the percentage of carbon in the atmosphere?  
 (a) Producers. (b) Decomposers.  
 (c) Primary consumers. (d) Secondary consumers.
- 52 Which of the following biological processes is a direct source of carbon that is found in carbohydrates stored in plant tissues?  
 (a) Respiration. (b) Excretion. (c) Photosynthesis. (d) Decomposition.
- 53 Carbon returns to the atmosphere from living and dead organisms respectively by the processes of .....  
 (a) respiration and decomposition (b) respiration and photosynthesis  
 (c) photosynthesis and decomposition (d) excretion and respiration

- 54 Which of the following living organisms play(s) a role in fixing atmospheric nitrogen in the soil?  
 (a) Green plants. (b) Nodular bacteria. (c) Mushroom fungus. (d) Herbivores.
- 55 Nitrogen reaches the producers after the .....  
 (a) respiration (b) decomposition of organic matter  
 (c) photosynthesis (d) nitrogen fixation
- 56 Nitrogen fixation occurs by some types of microorganisms in the .....  
 (a) soil (b) atmosphere (c) oceans (d) underground water
- 57 Carnivorous organisms obtain nitrogenous compounds from .....  
 (a) producers (b) herbivores (c) bacteria (d) fungi
- 58 Phosphorus compounds are found in .....  
 (a) atmosphere and soil (b) atmosphere only  
 (c) rocks and soil (d) water only
- 59 Which of the following elements is not found in the atmosphere but it is involved in the composition of some organic matter?  
 (a) Nitrogen. (b) Carbon. (c) Oxygen. (d) Phosphorus.
- 60 Which of the following spheres is not part of the phosphorus cycle in nature?  
 (a) Biosphere. (b) Atmosphere. (c) Lithosphere. (d) Hydrosphere.

## Second Miscellaneous Questions

- 1 Write the scientific term for each of the following statements:
- A group of biochemical reactions that occur continuously in the cells of the human body and included two opposing processes.
  - A vital process in which complex molecules are broken down to obtain energy.
  - A vital biological process by which metabolic waste products are removed from the body.
  - Microscopic units in the kidney that filter the blood from the metabolic waste products.
  - The process of retrieving useful substances from the renal filtrate in the nephron back into the blood.
  - A liquid is expelled out of the body and composed of excess water, some salts, and large amounts of urea.
  - An organ surrounds the human body from outside.



- (h) A layer of skin rich in fats that acts as a thermal insulator.
- (i) A liquid is expelled out of the body's surface and composed of water, mineral salts, and small amounts of urea.
- (j) An organ in the body is considered as a detoxification and treatment center of wastes.
- (k) A toxic substance produced from the breakdown of proteins and converted by the liver into urea.
- (l) A substance produced from the breakdown of hemoglobin and secreted in bile.

**2 Give reasons for:**

- (a) Excretion is not limited to the elimination of wastes of living organisms.
- (b) Disruption of bodily functions occurs when metabolic waste products accumulate.
- (c) The human body needs sodium, potassium and chloride ions.
- (d) In the process of reabsorption, the body returns back most of the glucose and water again.
- (e) The process of reabsorption is a vital step for maintaining the body's internal balance.
- (f) \* The skin plays an important role in regulating the body temperature.  
\* Excreting a large amount of sweat in hot weather helps the body stay balanced.
- (g) The skin acts as a thermal insulator.
- (h) The skin plays an important role in protecting the body and maintaining biological balance.
- (i) The amount of urine increases when large amounts of water are drunk.
- (j) Ammonia in the body is converted to urea before being excreted.
- (k) Bile contributes to maintaining the body's internal balance.
- (l) The liver acts as a detoxification center or treatment plant for wastes.
- (m) Regular respiration plays an important role in maintaining the body's internal balance.
- (n) Exhalation is considered a part of excretion process in human.
- (o) Nitrogen is an essential element for human growth.

**3 What happens in each of the following cases:**

- (a) Accumulation of metabolic wastes in the body.
- (b) High sodium concentration in the blood, "concerning: the kidney function".
- (c) Low sodium concentration in the blood, "concerning: the kidney function".
- (d) The stop of kidney nephrons functioning for several hours.
- (e) Inability of the kidney nephrons to perform reabsorption.
- (f) Absence of the fatty layer in skin.
- (g) Accumulation of bilirubin in the body.
- (h) Accumulation of carbon dioxide gas in the blood.
- (i) Increase in the rate of fuel combustion, "concerning: the carbon cycle in the atmosphere".
- (j) Increase in the number of decomposers, "concerning: the concentration of carbon dioxide in the atmosphere".
- (k) Absence of nodular bacteria in the soil, "concerning: the nitrogen cycle".

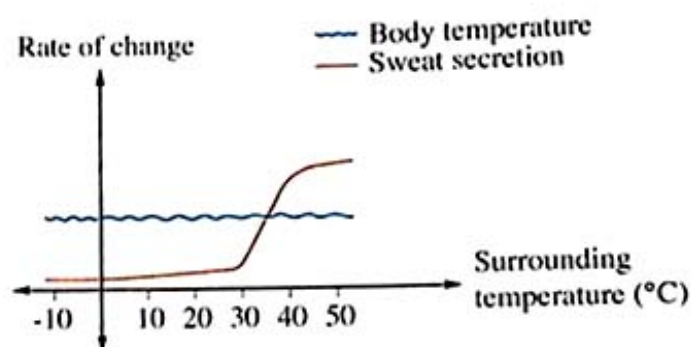
- 4 **Compare between each of the following:**
  - (a) Sweat and urine, "in terms of: the excretory organ – quantity of urea".
  - (b) Kidneys and liver, "in terms of: one role for both of them in keeping the body's internal balance".
- 5 **What is the role of the following organs in the excretion process:**
  - (1) Kidneys.
  - (2) Skin.
  - (3) Liver.
  - (4) Lungs.
- 6 **The skin with kidneys is a good example for the integration of the excretory organs in maintaining the body's internal balance. Explain this.**
- 7 **The human body produces urea as a result of the metabolism of certain food substances:**
  - (a) What are these food substances?
  - (b) Which organ is responsible for eliminating the largest amount of urea from the body?
- 8 **A person who has relied on a diet consisting solely of meat, eggs, and legumes for extended periods, what is the effect of this on the liver?**
- 9 **"Bio-Artificial Kidney is considered one of the modern technological applications for treating the kidney failure":**
  - (a) What is the basic physical principle of how the artificial kidney works?
  - (b) What is the biological aspect of using the artificial kidney in the treatment of kidney failure?
- 10 **Explain the role of thermal physics in monitoring the internal thermal equilibrium of the body.**
- 11 **Ultrasound devices rely on the properties of sound waves as they travel through different media. Explain this.**
- 12 **There are many metabolic waste products in human, mention two of them, with illustrating their sources.**
- 13 **The skin has multiple functions in human, explain that.**
- 14 **Briefly explain each of the following cycles in the biosphere:**
  - (a) Carbon cycle.
  - (b) Nitrogen cycle.
  - (c) Phosphorus cycle.



**Choose the correct answer:**

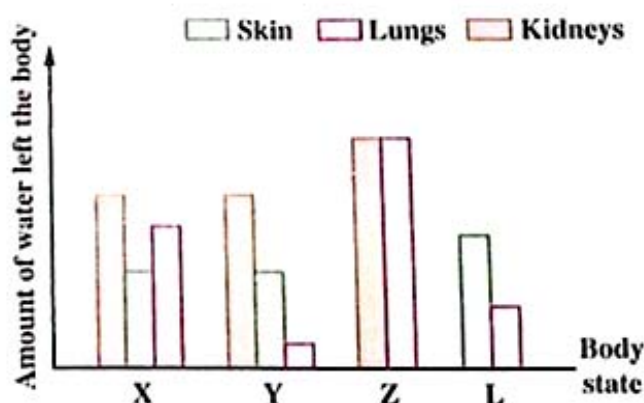
- 1 What is the effect of performing vigorous exercise on the amount of water lost from the body through the skin and kidneys compared to the normal rate, respectively?
  - (a) Decreases / Decreases.
  - (b) Decreases / Increases.
  - (c) Increases / Decreases.
  - (d) Increases / Increases.
- 2 Which choice expresses the percentage of nitrogenous wastes in the blood that leaves each of the liver and the two kidneys of a healthy person respectively, after eating a meal rich in proteins?
  - (a) High / High.
  - (b) High / Low.
  - (c) Low / High.
  - (d) Low / Low.
- 3 The following graph represents the relation between the surrounding temperature and the rate of change in the body temperature with the sweat secretion in human, which of the following can be concluded from the graph?

- (a) Sweat regulates the body temperature, when the surrounding temperature increases above  $30^{\circ}\text{C}$ .
- (b) The sweat amount plays a role in decreasing the body temperature at all the surrounding temperatures.
- (c) The body temperature is affected by changing the surrounding temperature.
- (d) There is an inverse relationship between the body temperature and the sweat amount.

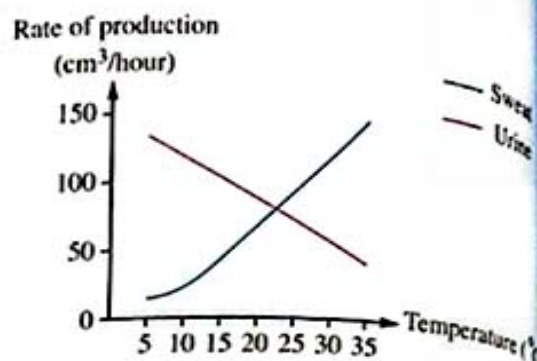


- 4 The opposite graph shows the amount of water that leaves the body from the excretory organs in different cases. Which case in the graph represents the state of the body during a short-distance running competition?

- (a) X
- (b) Y
- (c) Z
- (d) L



- 5 The opposite graph illustrates the rate of production of each of sweat and urine in human at different temperatures, which of the following statements is applied to this graph?



- (a) The more increase in temperature, the more decrease in the sweat production rate.
- (b) The rate of production of each of urine and sweat is equal at the temperature 22°C
- (c) The rate of each of urine and sweat production is directly proportional to the temperature.
- (d) There is no relation between the rate of production of urine and that of sweat.
- 6 The following table illustrates some components of urine for four people who have the same age and weight on a day of August, which one would you expect that he ate a legume-rich meal on the day before the urine sampling?

| Person | The percentage of urea in urine | The amount of water in urine |
|--------|---------------------------------|------------------------------|
| (a)    | High                            | Large                        |
| (b)    | High                            | Small                        |
| (c)    | Low                             | Large                        |
| (d)    | Low                             | Small                        |



اسم يعنى التفوق..





# كيفية طباعة صفحات معينة من ملف معين

## مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

# المراجعة رقم (2)

## اختبار شهر مارس







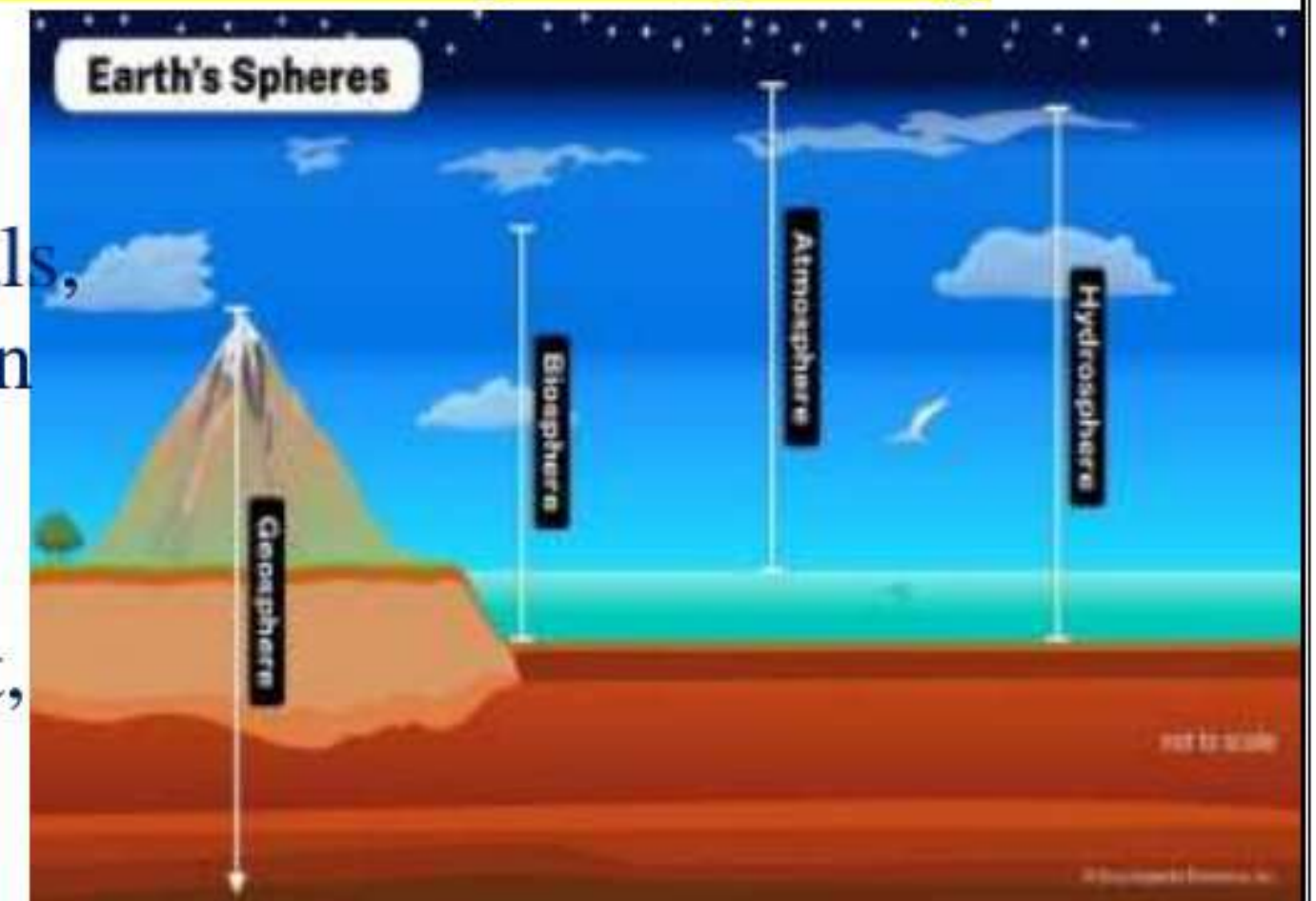
# Biosphere

## Lesson One The Biosphere and Its Stability

**The biosphere** the biosphere is the part of planet Earth where life exists, extending from the depths of the oceans to the mountain peaks, passing through the land and air.

**The biosphere** is a vast, integrated system that includes all living organisms (plants, animals, microorganisms, and all the environments in which they live).

**Living organisms** in the biosphere constantly interact with their surrounding environment, in a continuous exchange of matter and energy.



### The Relationship of the Biosphere to the Other Spheres

The biosphere is closely linked to the other spheres that make up planet Earth. It does not operate in isolation from them, but rather depends on them for the continuation and balance of life.

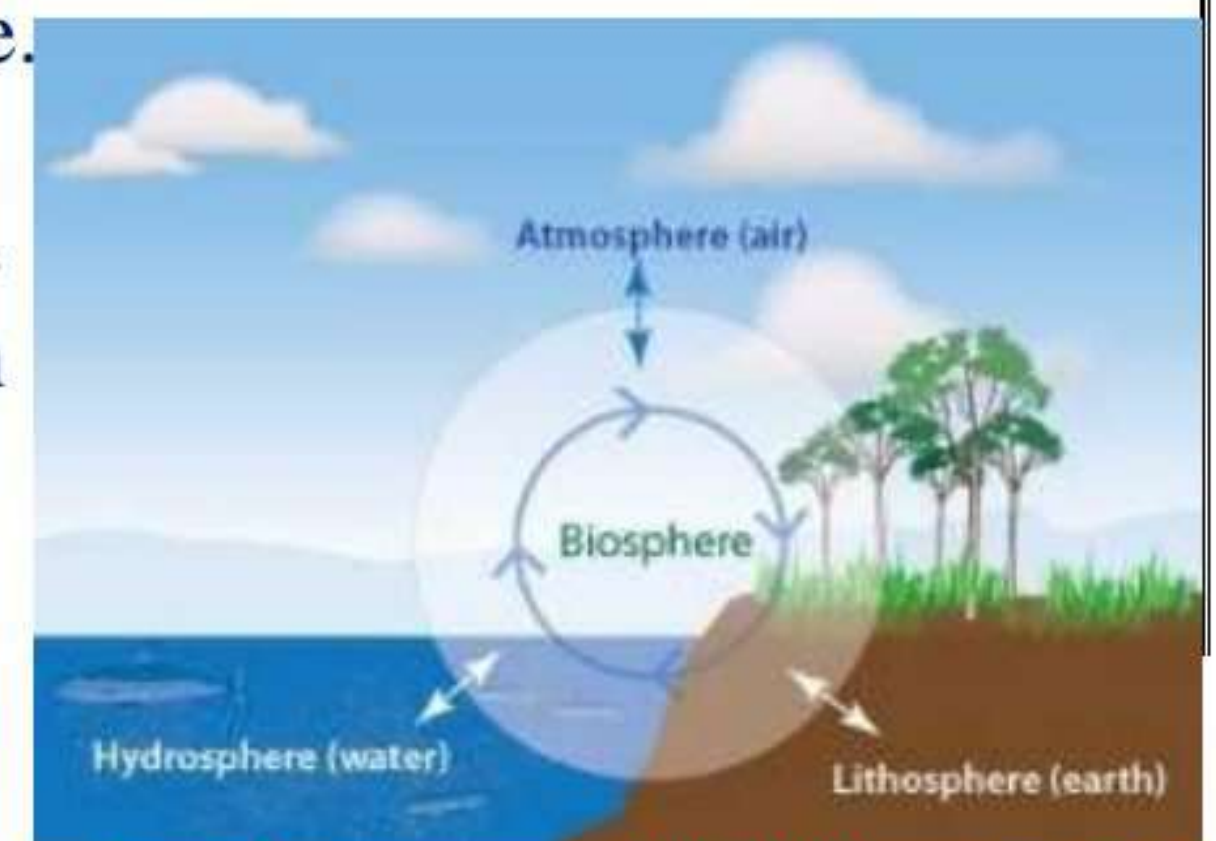
**The living organisms** that make up the biosphere constantly interact with the hydrosphere, which provides them with the water necessary for all vital processes, and with the atmosphere, which provides essential gases such as oxygen, necessary for respiration, and carbon dioxide, necessary for photosynthesis.

**The lithosphere** provides mineral elements through the soil upon which plants depend for their growth and stability.

**The plant life cycle** is a clear example of this interaction.

**When a plant absorbs water and salts** from the soil (hydrosphere and lithosphere) and **carbon dioxide** from the air (atmosphere), it uses the **sun's energy** to produce food that enables it to grow within the biosphere.

**The plant releases oxygen** into the air (atmosphere) and returns some of the water to the atmosphere in the form of water vapor (hydrosphere). When the plant dies, it decomposes in the soil into simpler substances (lithosphere).







## Biotic and Abiotic Factors

The biosphere consists of living and non-living components that work together in a balanced system that makes life possible on Earth.

## Biosphere

### Abiotic

### Biotic

Hydrosphere

Lithosphere

Plants

Humans

Atmosphere

Animals

## Biotic Factors

## Diagram of the Biosphere

These include all living organisms that affect and are affected by the environment, such as plants, animals, and microorganisms.

These organisms play different roles within ecosystems;

A-plants produce food through photosynthesis and are the primary source of energy for other organisms.

B-Animals are classified as consumers that depend on plants or other animals (prey) for their food.

C- decomposers such as bacteria and fungi break down the remains of dead organisms and return essential materials and elements to the environment for the ecosystem to benefit from again.

## Abiotic Factors

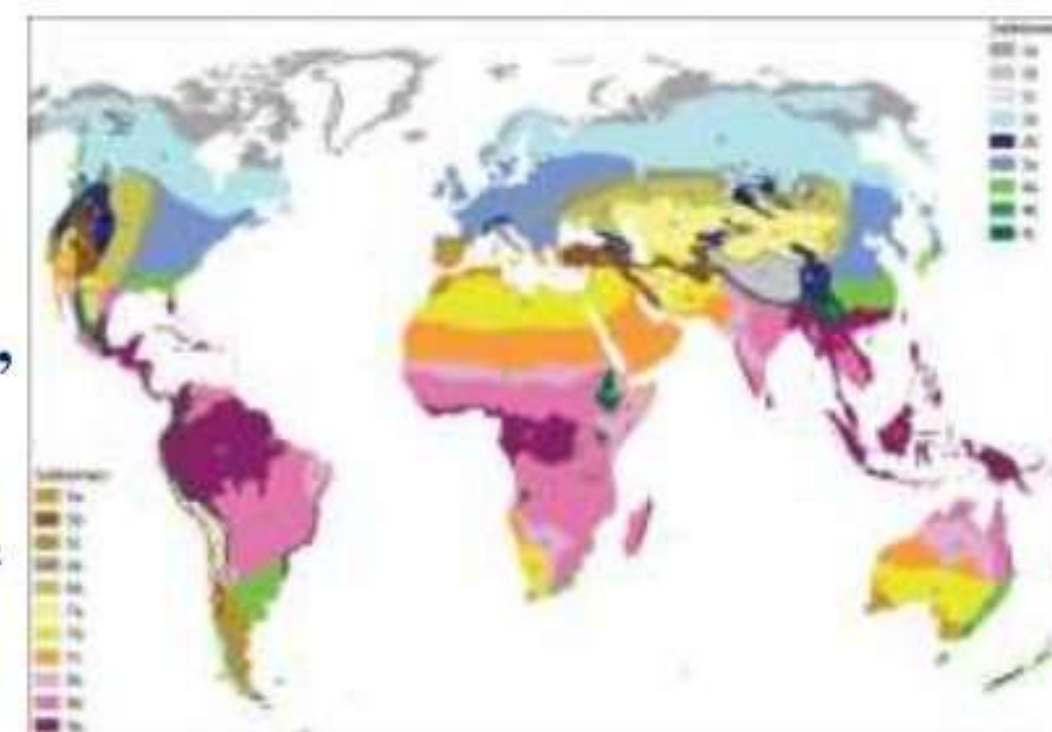
are the non-living components of the environment, including light, water, temperature, soil, minerals, and air.

These factors are responsible for determining the type of organisms that can live in a special area, as each living organism needs specific environmental conditions to grow and survive.

Biotic and abiotic factors interact to form a balanced ecosystem that sustains life in the biosphere.

In a lake ecosystem, for example, fish, algae, and bacteria interact with the physical and chemical elements of the water in a continuous cycle of matter and energy exchange.

When several ecosystems share similar climatic characteristics and dominant organisms, (biome) For example, the rainforests of the Amazon, Africa, and Asia represent biomes that share a warm, humid climate and abundant biodiversity, while the great deserts share harsh climatic characteristics and drought-adapted plants.







The highest and most comprehensive level is **the biosphere**, the vast system that encompasses all biomes on Earth's surface, including land, water, and air, and contains all life forms and their interactions with the other spheres of planet.

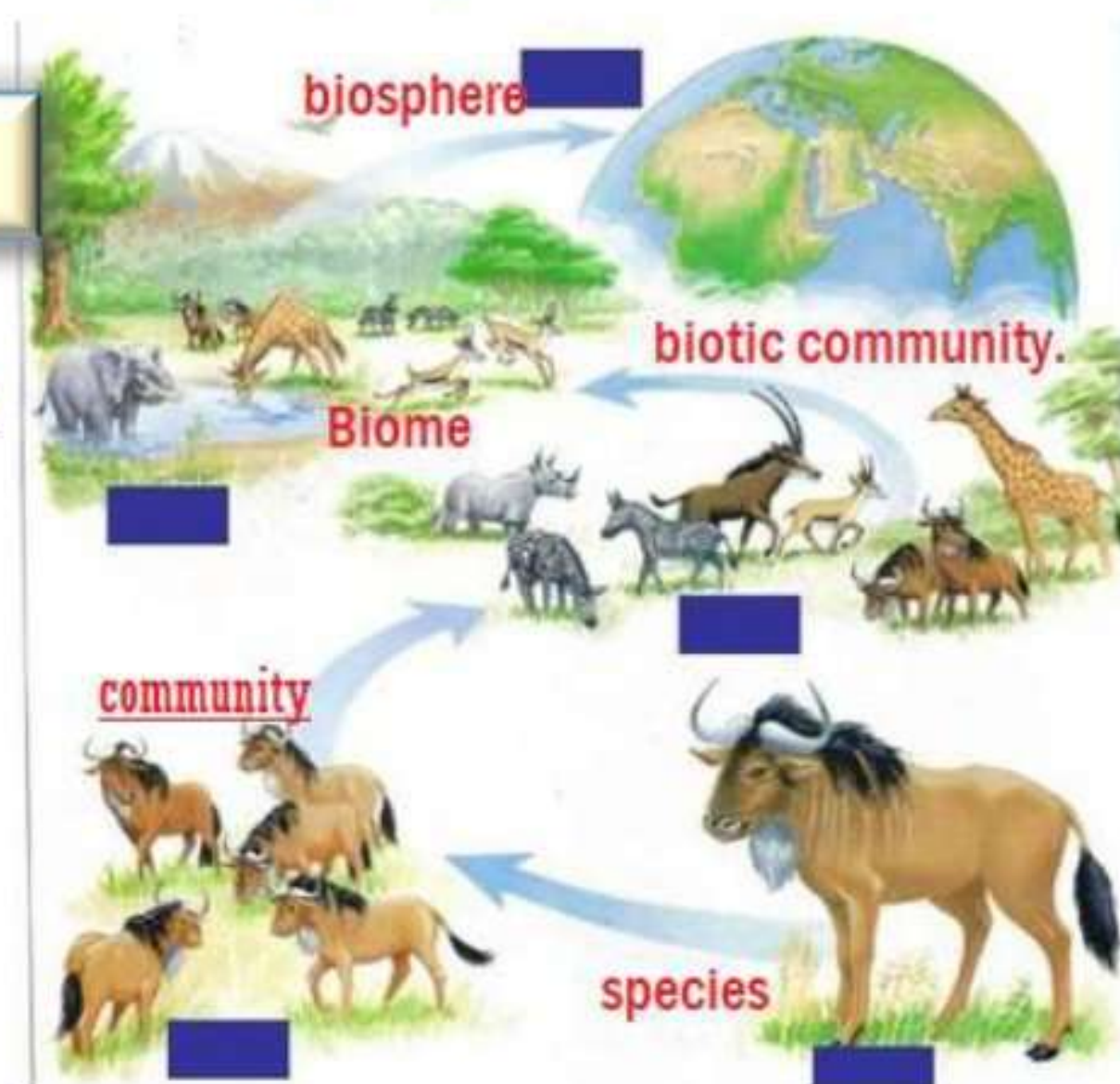
**The biosphere** extends from the ocean depths to the highest mountains.

**Thus, the organization of life progresses** in an integrated hierarchy, where the highest level consists of a set of lower levels, linked by complex and reciprocal interactions that ensure the survival of living organisms and the balance of ecosystems on our planet.

### **Levels of Organization in the Biosphere**

Living organisms live within an integrated system; no species can exist in isolation from other species or from its surrounding environment.

**Life on Earth is organized in graduated levels** of complexity, beginning with the individual organism and ending with the largest, the biosphere, which encompasses all life on planet Earth.



**The organism represents the first level of this sequence**; it is a single individual of a particular species, like a single fish in a pond or a single tree in a forest. A group of individuals of the same species forms a **community**, such as a group of **antelopes** in the African savanna or a group of fish in the waters of the Red Sea, where members of the community share the same space and time and interact with each other for food, reproduction, and protection.

**When different biotic communities** of multiple species come together and live in one area, they form a **biotic community**, such as a forest, which includes trees, herbaceous plants, insects, birds, and mammals, all interacting in a complex network of food relationships.

**Food webs** the basic mechanisms linking in the levels, which illustrate how organisms obtain matter and energy.

And how each organism obtains its food shows its role within the biotic community and its position in the food web, and demonstrates how energy and nutrients are transferred across the different levels of organization of life.



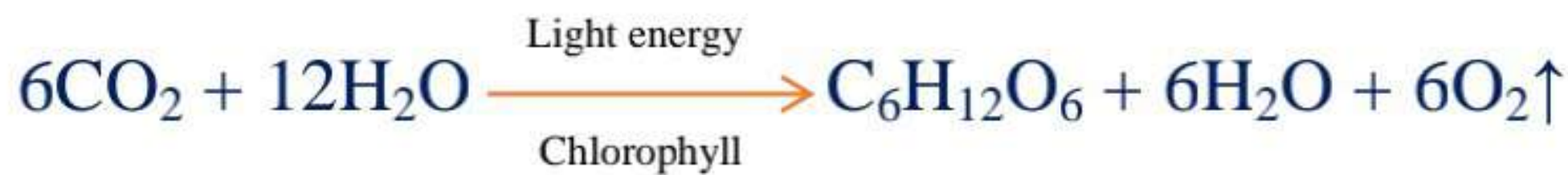


## Feeding patterns and energy transfer in an ecosystem

Food formation in an ecosystem begins with organisms known as autotrophic organisms, or producers.

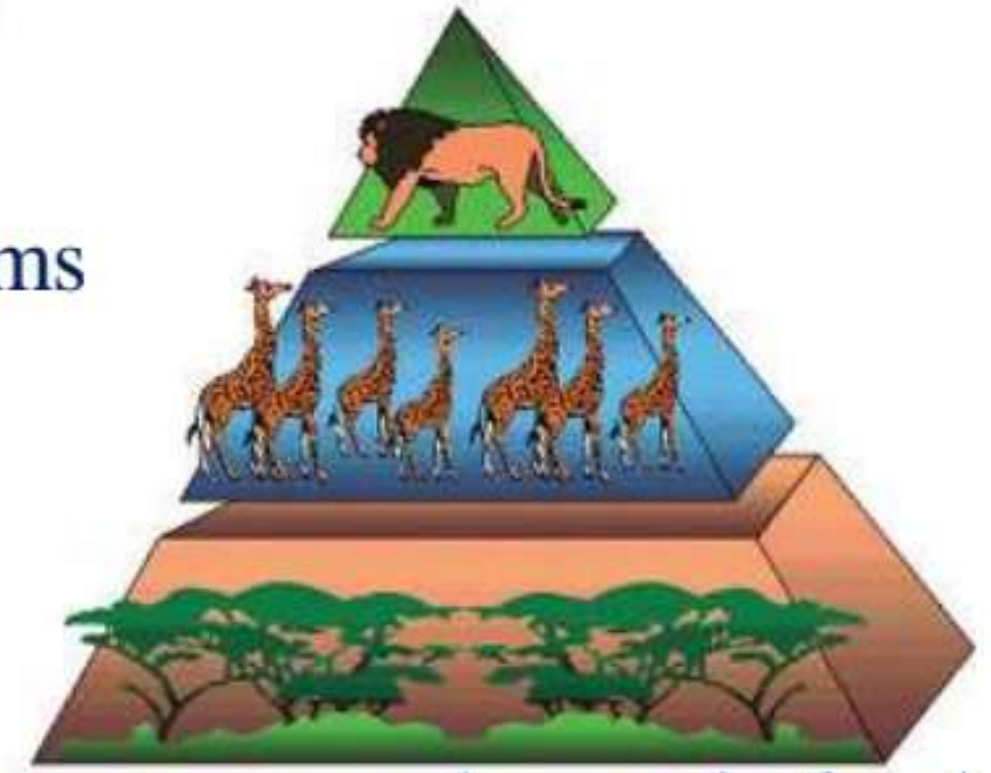
**Producers** are able to converting inorganic matter into organic compounds (energy-storing). Like green plants and algae, as well as some specialized bacteria.

Plants use light energy, carbon dioxide, and water to make sugars and organic food in the process of photosynthesis, and can express this process simply with the following chemical equation:



Producers form the base of the pyramid (G.R.)? because all the energy comes from their conversion of light energy into usable chemical energy.

**Heterotrophic (consumers)** cannot produce their own food but obtain it by consuming producers or other consumers.



### Consumers can be divided

Primary consumers (herbivores) feed directly on plants

Secondary consumers feed on herbivores and progress to higher predators

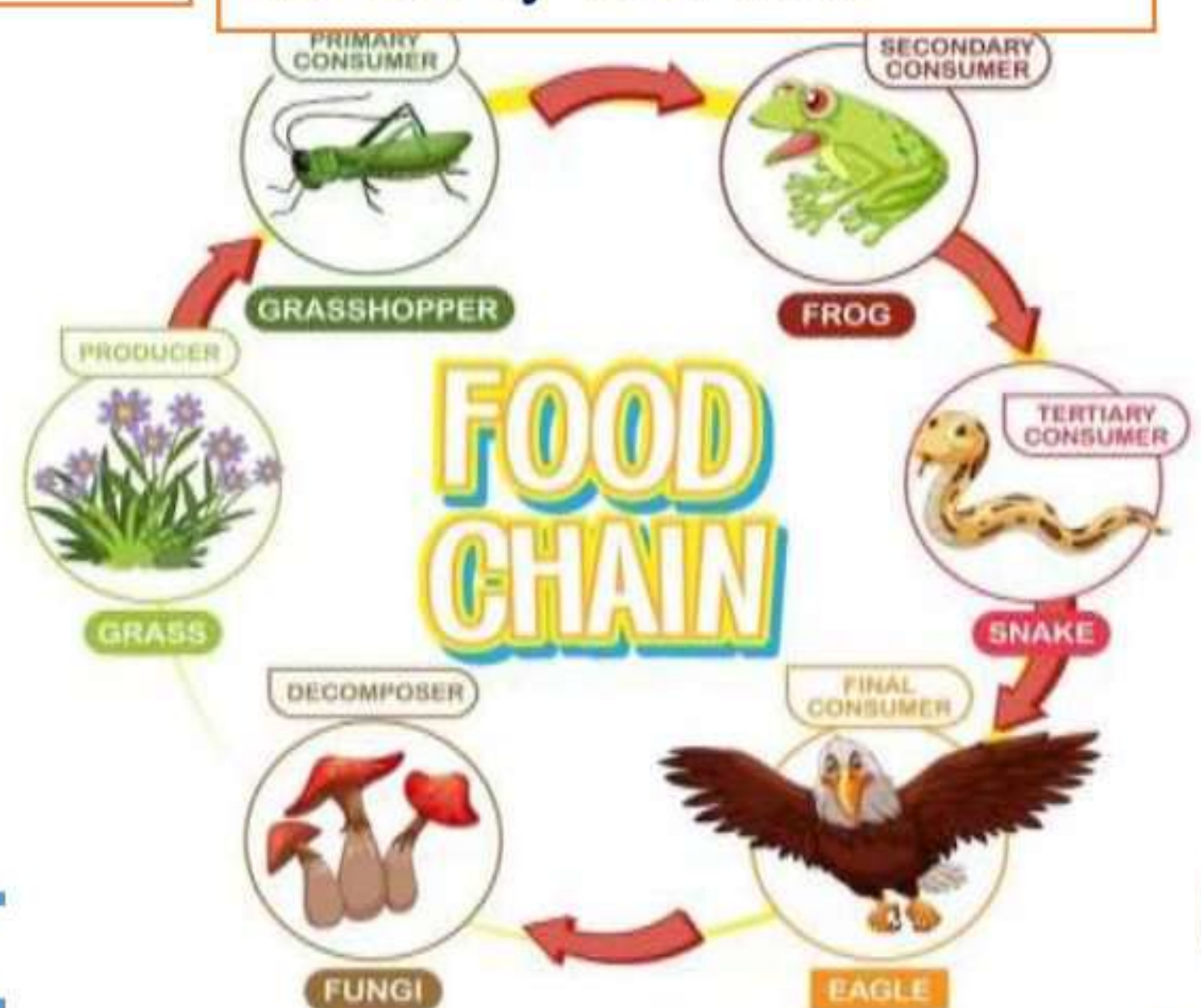
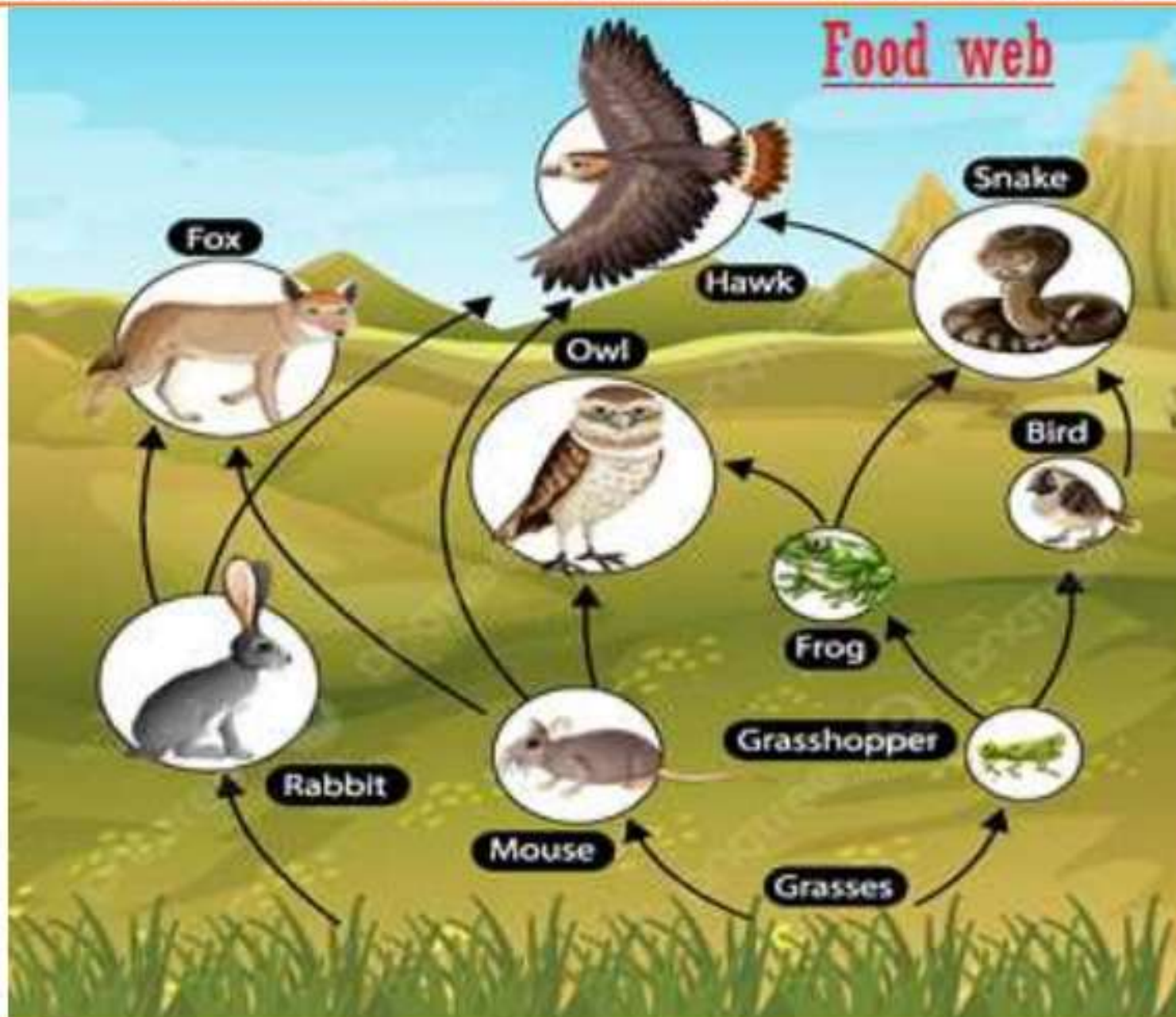
### Examples of feeding levels

#### In the hydrosphere

Microalgae (producers) feed small fish (primary consumers), which in turn feed larger predatory fish (secondary or tertiary consumers).

#### In the terrestrial system

Trees and plants form a base for rabbits and deer, which are fed by wolves or







## Energy Flow in the Ecosystem

Food levels can also be studied through the flow of energy between them.

When a herbivore eats a plant, it obtain only a small part (10%).

Part of the energy transferred to the animal is stored in its cells and tissues.

The remaining energy (90%) does not pass to the next food level.

It is distributed along several pathways, such as:

### 1. Energy used by the animal in vital processes

The animal uses part of the energy transferred to it from the plant to perform vital processes and activities such as digestion, respiration, movement, and others. These activities consume a large amount of energy.

### 2-Energy lost as heat

During the animal's activity and its performance of vital processes, a quantity of thermal energy is produced that is transferred to the environment and is not transferred to the organism that feeds on this animal

### 3-Energy stored in undigested material

Some parts of the plant that the animal eats are not fully digested, such as tough fibers, and therefore the animal excretes some of the stored energy in its wastes



Small port of the energy is transferred to the herbivore.

Small port of the energy is transferred from the herbivore to its predator.

The amount of energy transferred from one trophic level to another decreases as we move up the energy pyramid from producers to consumers.

The ecological pyramid models are used to represent the amount of energy, the number of organisms, or their biomass at different trophic levels.

Producers form the base of the pyramid and its largest level, being the most numerous and possessing the greatest amount of energy.

The amount of energy, the number of organisms, or biomass gradually decreases as we move from one level to the next, with the available energy decreasing little by little towards the apex of the pyramid.







The number of organisms at the top of the pyramid decreases (G.R.)? because the available energy only supports a small number of individuals.

the small number of large predators compared to the abundance of plants and herbivores.

If you have 10,000 energy units stored in a certain number of plants (producers), only 1,000 units will reach the herbivores that fed on them (primary consumers), then 100 units to the carnivores that fed on the herbivores (secondary consumers), and perhaps only 10 units to the large predator that fed on the carnivores (tertiary consumers).



in desert regions, producers are limited(G.R.)? due to water scarcity and extreme heat.

Animals adapt to be energy efficient, food webs are simpler and more dependent on intermittent food sources, and complex food webs also exist, consisting of multiple interconnected chains in which the consumer does not depend on a single food source, but on multiple sources.

This interconnectedness makes a biotic community more resilient to the loss of a single species, but it also makes negative impacts such as deforestation or water pollution far-reaching, as their effects extend throughout the entire network.

### Technological Applications

أطواق ذكية

Scientists have developed smart collars with tiny sensors.

These are placed around the necks of wild animals in Kenyan nature reserves.

The sensors measure the amount of energy the animal expends each day while it is active and foraging, measuring movement rate, pulse, and body temperature.

Using artificial intelligence, (Ai) the data is analyzed to determine how much energy the animals are losing.



الوشق الأيبيري

This innovation helped save endangered herds of Iberian lynx after researchers discovered that declining prey populations had drastically reduced their available energy, enabling reserve experts to intervene and provide a better feeding environment.

Studying feeding patterns is 1- a classification of organisms,  
2- Tool for understanding the dynamics of ecosystems,  
3- How they maintain their balance, or how ecological functions collapse when exposed to disruptive human or natural factors.





## Chemical Compounds in the Biosphere

All forms of nutrition in living organisms aim to provide them with the basic chemical compounds upon which life depends.

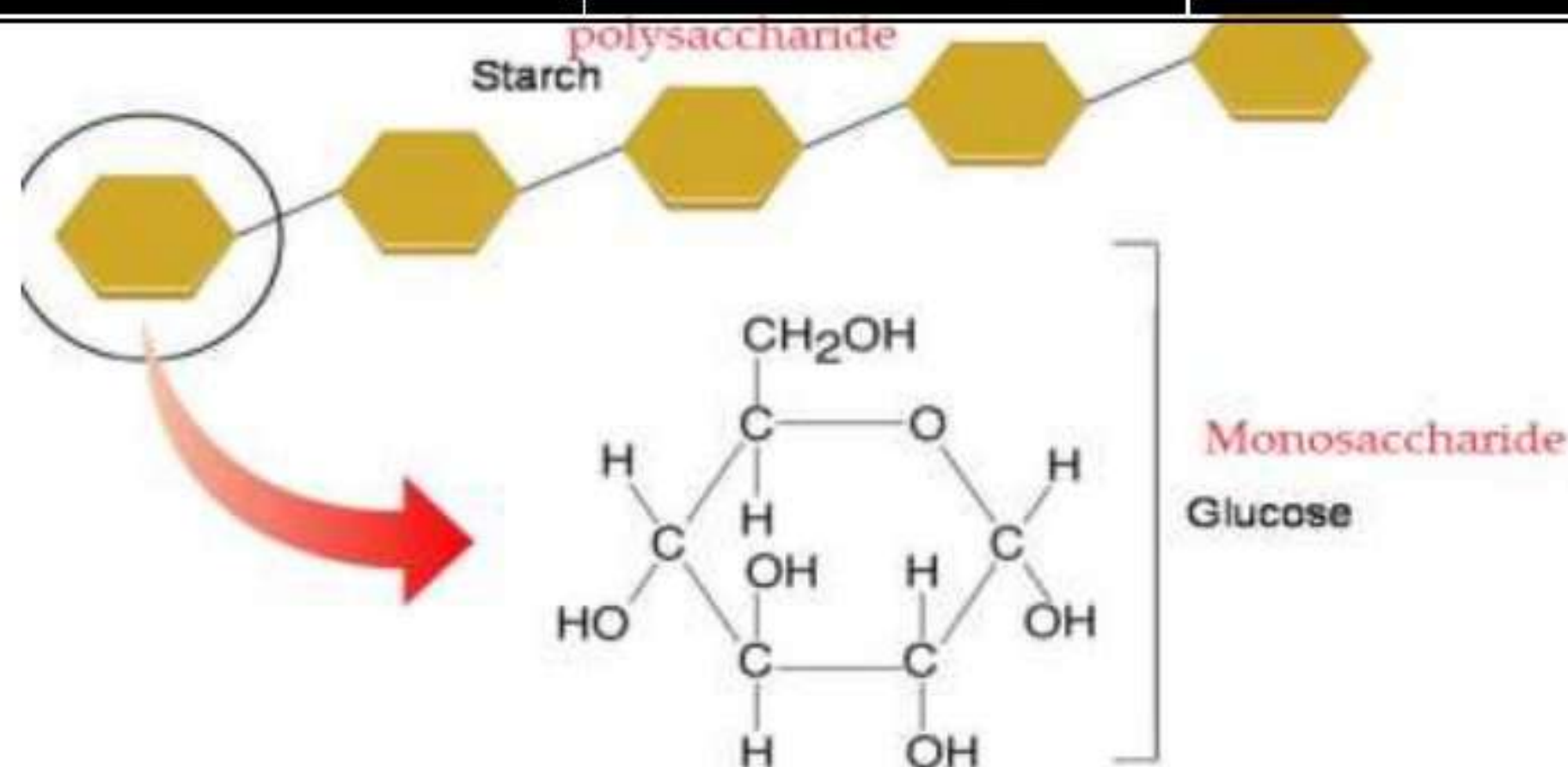
**The organic compounds** consist of four main groups: (carbohydrates, proteins, lipids, and nucleic acids.) These compounds represent the sources in which energy is stored and the elements that regulate vital processes. Below, we will learn about the most important of these compounds, their structure, and their vital functions.

### Fist: Carbohydrates: The Main Source of Energy

**Carbohydrates** are the most common organic compounds in living organisms, **Carbohydrates molecules** consist of **carbon**, **hydrogen**, and **oxygen** in ratio of (1:2:1) **respectively**. They are the main source of energy in most living organisms, as these compounds are broken down in cells to produce the energy necessary for vital activities.

Carbohydrates are divided into three main types

| <b>Monosaccharides</b>                                                                                                           | <b>Disaccharides</b>                                         | <b>Polysaccharides</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| the simplest form of carbohydrates                                                                                               | Made of two monosaccharide                                   | complex compounds made up of many monosaccharides                                                                                                                                                                                                                                                                                                                                                                                                |
| Used directly in cellular respiration to produce energy, such as <b>glucose</b> (Grape sugar) and <b>fructose</b> (fruit sugar). | such as sucrose (cane sugar) and <b>lactose</b> (milk sugar) | They are involved in cell building, energy storage, or the formation of <b>supporting structures</b> , such as<br><b>1-cellulose</b> , which is part of plant <b>cell walls</b><br><b>2-chitin</b> , which is part of the <b>exoskeletons of arthropods</b> ;<br><b>3-starch</b> , which is stored in plants (in <b>leaves</b> and <b>tubers</b> );<br><b>4-glycogen</b> , which is stored in animals (in the <b>liver</b> and <b>muscles</b> ). |







## Energy in Living Cells

Adenosine triphosphate (ATP) molecules are the direct source of energy in living cells. They represent a form of chemical energy that can be used directly in various vital processes.

ATP (adenosine triphosphate) consists of

1- three phosphate groups

2- molecule adenosine.

The bond between the second and third phosphate groups is high-energy (G.R.?) because it requires a large amount of energy to form.

When this bond breaks, a quantity of energy is released that the cell can directly utilize in performing its vital functions, such as muscle contraction or transporting materials across membranes.

When glucose, produced by photosynthesis or derived from food in heterotrophic organisms, enters the cell, it is broken down in a series of chemical reactions known as cellular respiration.

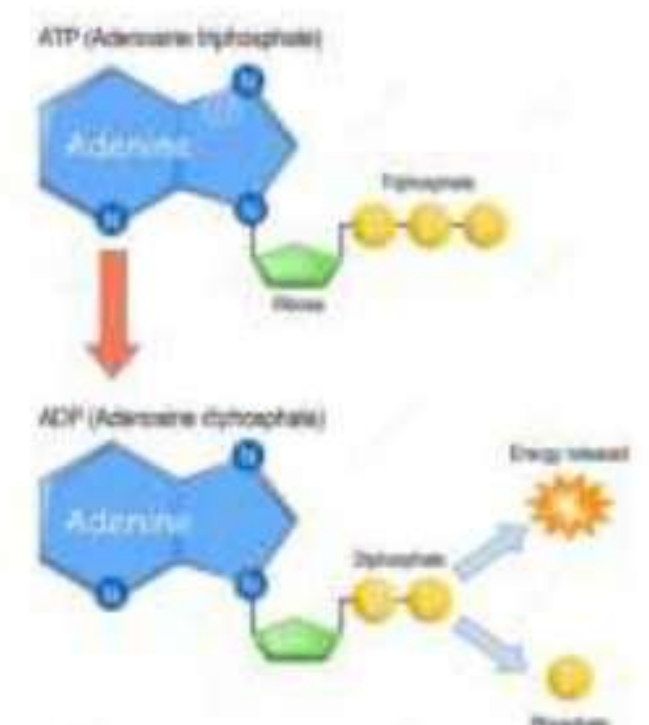
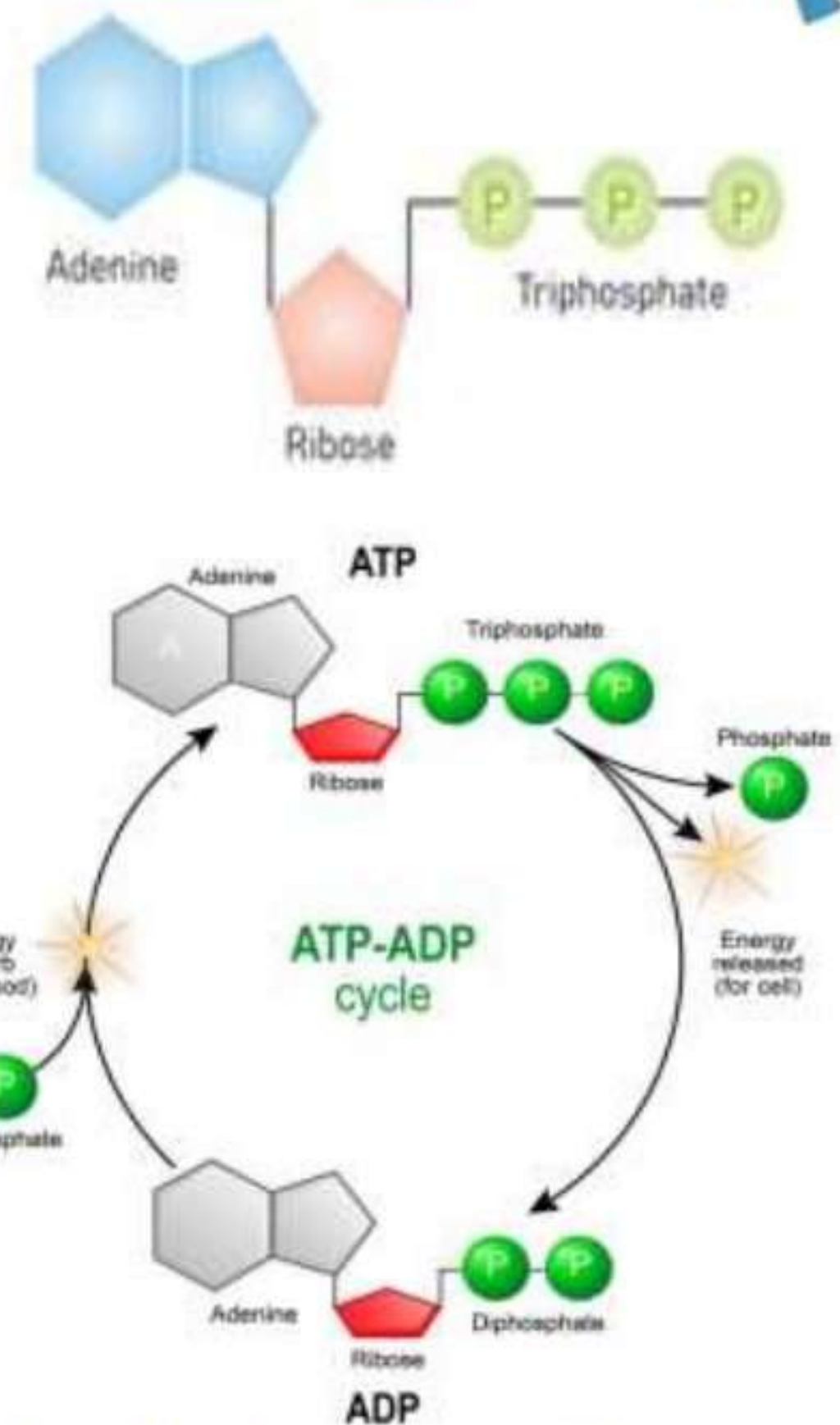
During this process, its chemical bonds are gradually broken, releasing energy. This energy is not used directly but is stored in ATP molecules.

When a cell needs energy, this bond breaks, converting ATP molecules into Adenosine diphosphate (ADP). This releases the energy needed for the cell to perform its functions, such as muscle contraction, transporting materials across membranes, or building biomolecules.

By adding a new phosphate group, the cell can regenerate an active ATP molecule from ADP, using some of the energy produced from the oxidation of glucose to ATP. This continues the delicate biological cycle that ensures cells have a continuous and renewable energy supply to sustain life.

تُعد أجهزة مراقبة الجلوكوز المستمرة

Continuous glucose monitoring (CGM) devices are among the most important modern health innovations. They measure blood sugar levels inside the body every few minutes without pricking, helping to track the availability of carbohydrates as an energy source before they are converted into ATP molecules





These devices help patients and athletes understand the impact of carbohydrate meals on energy production and adjust their eating patterns and physical exertion levels accurately to maintain stable energy and better health.



## **Second: Proteins: Functional Building units in Living Organisms in the Biosphere**

**Proteins** are large, complex molecules made up of amino acids. These molecules contain the elements carbon, hydrogen, oxygen, and nitrogen, and sometimes sulfur. They constitute the main building unit in the bodies and in the structure of muscles, enzymes, some hormones, and antibodies.

**Proteins** differ according to the arrangement of amino acids within their chains, and this arrangement determines their shape and function.

For example, structural proteins such as keratin give strength to hair and nails, while enzymatic proteins such as amylase act as catalysts that accelerate the rate of biochemical reactions within the body without being consumed in the process. When proteins are broken down during digestion, they are converted into amino acids that are reused to build new proteins according to the needs of the cells.

## **Third: Lipids: Energy Stores**

Lipids are organic compounds whose molecules are mainly composed of carbon, hydrogen, and oxygen.

They are a concentrated source of energy in the body, producing twice the energy of carbohydrates when oxidized.

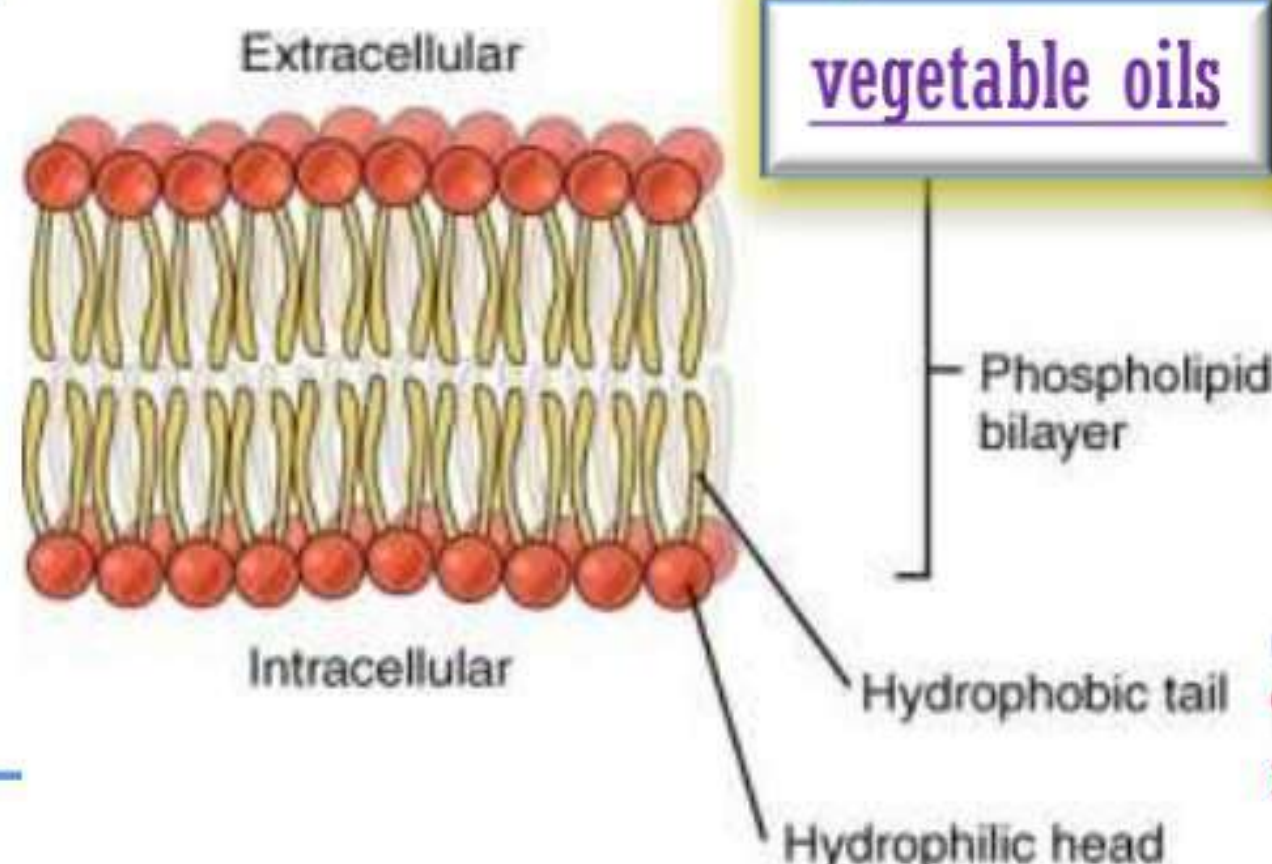
They also act as thermal insulation, maintaining body temperature, such as the thick layer of fat in a polar bear.



**Phospholipids** are fatty molecules containing a phosphate group and are an essential part of cell membrane structure, forming a double layer surrounding the cell.

fats stored in fatty tissue for use by cells when energy is needed.

Some types of fats, such as cholesterol, are involved in the formation of certain hormones and vitamin D.



### **Forms of fats**

vegetable oils
animal fats





## Comparing the heat content of Fats and Carbohydrates.

**Heat content** is the amount of heat produced by burning one gram of food, Its unit kilojoules per gram (kJ/g).

In practice, the adult unit kcal/g is usually used, (1 Calorie =4.18)

### Practical Experiment

#### Tools:

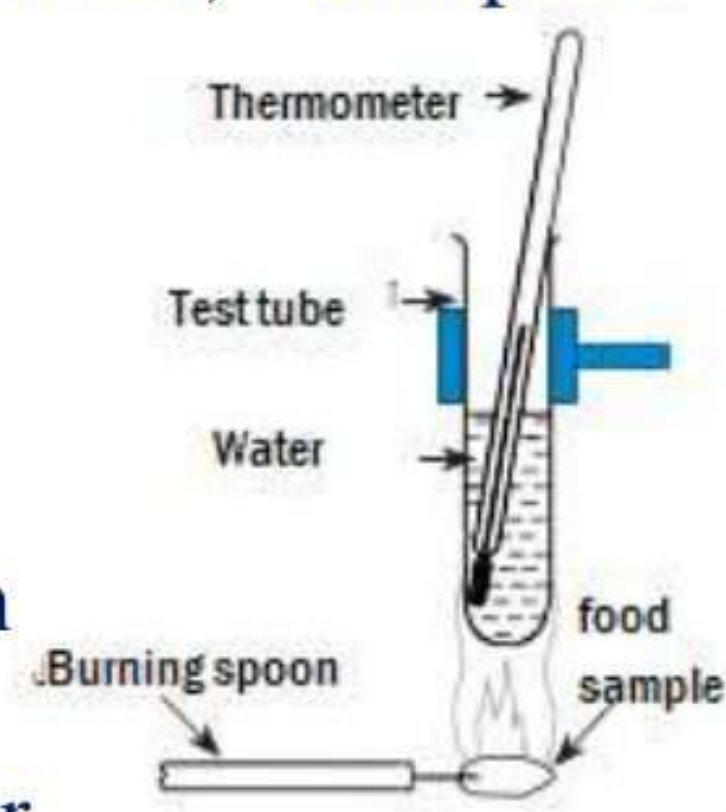
Test tube - Combustion spoon - Bunsen burner - Sensitive balance - Thermometer - Water - Sample of white sugar (carbohydrate) - Sample of pure vegetable oil (fat).

#### Steps

- 1- Place a suitable volume of water in the test tube.
- 2-Record the initial water temperature ( $t_1$ ) using the thermometer.
- 3-Place a certain mass of sugar (108) in the combustion spoon
- 4-Begin burning the food sample using a Bunsen burner flame 1 cm from the test tube until completely burned.
- 5-Record the final temperature of the water ( $t_2$ ).

The change in temperature of the water sample ( $t_1$ ,  $t_2$ ) represents the amount of energy gained by the water and the test tube, which in turn represents the amount of energy released from the food sample when it is deflected.

- 6-Repeat the previous steps with a similar mass of cooking oil.



#### Record your observations .....

#### Conclusion: .....

### Modern Technology and the Interpretation of Biomolecule Structure from a Physical Perspective

Modern technology has led to the development of precise instruments that have enabled scientists to study the basic compounds of life at the molecular level. the most important of these instruments is the electron microscope, which relies on the use of a beam of electrons instead of light to form an image.

The wavelength accompanying the electron can be controlled to be much shorter than the wavelength of light,



Integrated  
SCIENCE

Alifaz Nazmy /01222978682 01005136959







allowing the visualization of very small structures such as membrane proteins and lipids that cannot be seen with conventional light microscopes.

This advance has helped in understanding how molecules are arranged within cells.

**Especially plasma membrane** that are built from double layer of lipids, which has contributed to the design of modern drugs that target specific proteins inside the cell between foods.

the extent of integration between different branches of science in producing modern materials and tools that improve the quality of life and maintain balance on planet Earth.

#### **Fourth: Nucleic Acids and Ensuring the Continuity of Life in the Biosphere**

Nucleic acids are the basis of heredity in all living organisms.

They carry the genetic code responsible for determining the organism's characteristics and regulating the functions of its cells

Nucleic acids are made up of small units ( nucleotides ) each consisting of a five-carbon sugar, a phosphate group, and a nitrogenous base.

The nitrogenous bases are adenine (A), thymine (T), cytosine (C), and guanine (G).

The arrangement of these bases creates what is known as the genetic code, which determines all the characteristics of an organism.

**There are two main types of nucleic acids.**

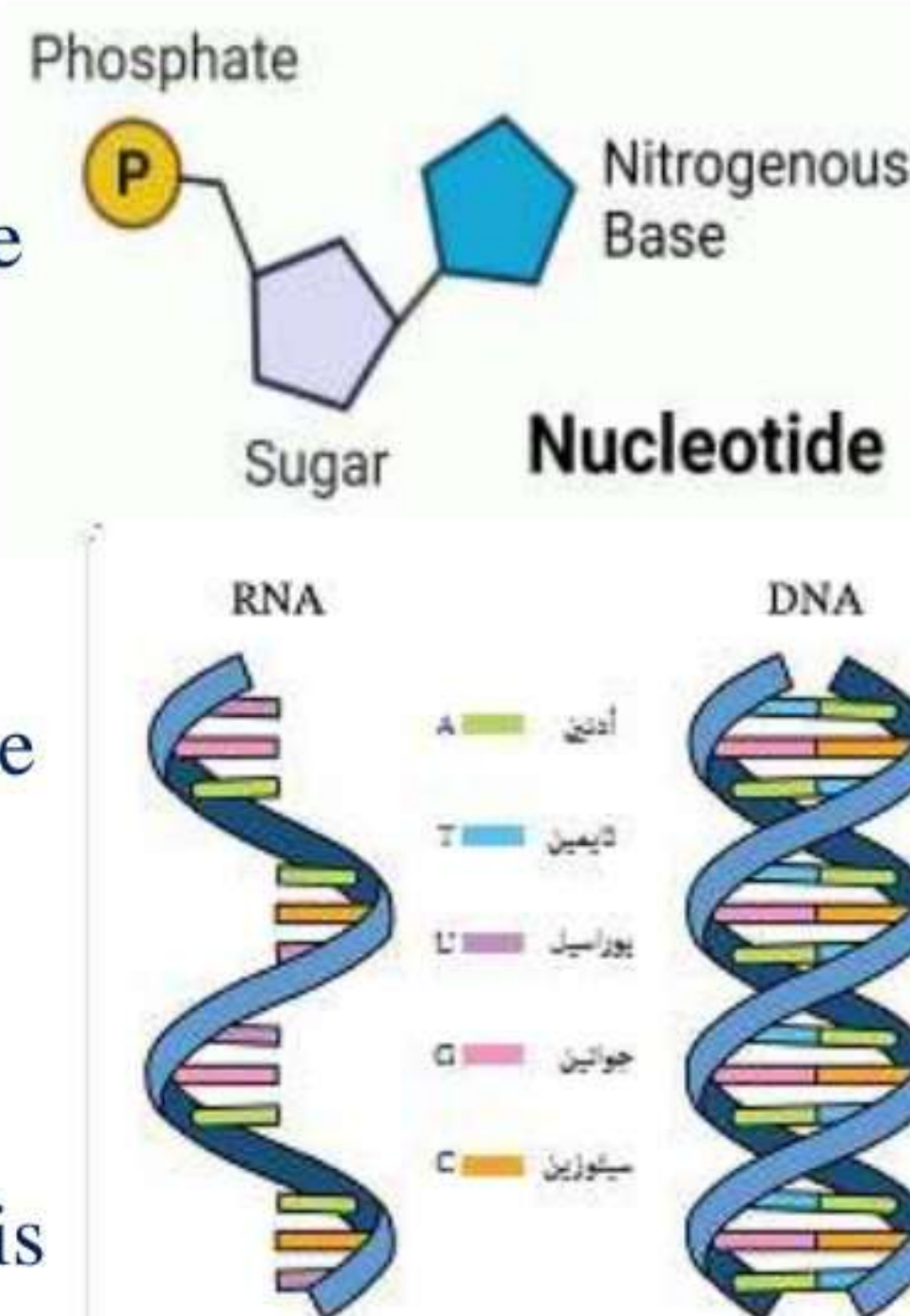
Deoxyribonucleic acid (DNA), which carries the genetic information within the cell nucleus of eukaryotic organisms and carries the genetic information that is passed from generation to generation

Ribonucleic acid (RNA), which is involved in converting this genetic information into proteins that carry out the cell's functions.

**Modern Technological Applications**

کریسپر-کاس 9

In modern laboratories, CRISPR-Cas9 technology is one of the latest genetic engineering tools used to edit DNA.







Scientists use this system as a high-precision molecular scissors to target a specific sequence of nitrogenous bases (adenine, thiamine, cytosine, and guanine) within the cell genome (the complete set of genetic information in an organism). This extreme precision allows for specific gene editing for the purpose of correcting defective or disease-causing genes, such as those that cause sickle cell anemia adding new genes or removing unwanted genes to produce crops with improved characteristics and disease resistance.





**Chapter One (3) Lesson (1)****Choose the correct answer****Choose the correct answer**

1. The part of Earth where life exists is called the:

- A) Atmosphere    B) Lithosphere    C) Hydrosphere    D) Biosphere

2. The biosphere extends from:

- A) Earth's surface only    B) Mountain peaks only  
C) Ocean depths only    D) Ocean depths to mountain peaks

3. The sphere that provides water for living organisms is the:

- A) Atmosphere    B) Lithosphere    C) Hydrosphere    D) Biosphere

4. The gas necessary for respiration is:

- A) Nitrogen    B) Oxygen    C) Carbon dioxide    D) Hydrogen

5. The gas necessary for photosynthesis is:

- A) Oxygen    B) Nitrogen    C) Carbon dioxide    D) Helium

6. Soil and minerals belong to the:

- A) Atmosphere    B) Hydrosphere    C) Lithosphere    D) Biosphere

7. Plants in a food chain are classified as:

- A) Consumers    B) Decomposers    C) Predators    D) Producers

8. Animals that feed on plants or other animals are called:

- A) Producers    B) Consumers    C) Decomposers    D) Autotrophs

9. Bacteria and fungi are examples of:

- A) Producers    B) Consumers    C) Decomposers    D) Predators

10. Light, temperature, and water are examples of:

- A) Biotic factors    B) Producers    C) Consumers    D) **Abiotic factors**

11. The interaction between living and non-living components forms a(n):

- A) Population    B) Community    C) Ecosystem    D) Biome

12. A group of organisms of the same species living together is called a:

- A) Community    B) Population    C) Ecosystem    D) Biome

13. A group of different species living in one area is called a:

- A) Population    B) Community    C) Biome    D) Biosphere

14. A group of ecosystems with similar climate is called a:

- A) Biosphere    B) Ecosystem    C) Biome    D) Population

15. The largest level of organization of life is the:

- A) Ecosystem    B) Biome    C) Community    D) Biosphere

16. The smallest level of organization is the:

- A) Population    B) Community    C) Organism    D) Ecosystem

17. Food webs show:

- A) Shape of organisms    B) Number of organisms  
C) Transfer of energy and matter    D) Habitat only

18. Producers make their food by:

- A) Respiration    B) Digestion    C) Fermentation    D) **Photosynthesis**

19. The main source of energy in ecosystems is the:

- A) Water    B) Soil    C) Sun    D) Oxygen







20. The approximate percentage of energy transferred to the next trophic level is:

- A) 90%    B) 50%    C) **10%**    D) 100%

21. Most energy is lost from organisms as:

- A) Food    B) Light    C) **Heat**    D) Matter

22. The base of the energy pyramid consists of:

- A) Carnivores    B) Herbivores    C) Decomposers    D) **Producers**

23. The number of organisms decreases toward the top of the pyramid because of:

- A) More food    B) Less available energy    C) More oxygen    D) Higher temperature

24. Producers are limited in deserts because of:

- A) Heavy rain    B) **Water** scarcity    C) Fertile soil    D) Low temperature

25. The chemical formula of glucose is:

- A) CO<sub>2</sub>    B) H<sub>2</sub>O    C) **C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>**    D) O<sub>2</sub>

26. The direct source of energy in cells is:

- A) Glucose    B) ADP    C) **ATP**    D) DNA

27. ATP consists of:

- A) Sugar only    B) Bases only    C) Adenosine and three phosphate groups    D) Lipids

28. Energy is released when:

- A) ATP is formed    B) A phosphate bond is broken    C) DNA is copied    D) Oxygen is used

29. Cellular respiration occurs in the:

- A) Nucleus    B) Ribosomes    C) Chloroplasts    D) **Mitochondria**

30. Carbohydrates contain carbon, hydrogen, and oxygen in the ratio:

- A) 2:1:1    B) **1:2:1**    C) 1:1:2    D) 2:2:1

31. The simplest carbohydrates are:

- A) Disaccharides    B) Polysaccharides    C) **Monosaccharides**    D) Starch

32. Starch is stored in:

- A) Animals    B) **Plants**    C) Bacteria    D) Fungi

33. Glycogen is stored in:

- A) **Plants**    B) Leaves    C) Animals    D) Wood

34. Proteins are made of units called:

- A) Fatty acids    B) Nucleotides    C) Sugars    D) **Amino acids**

35. Enzymes are classified as:

- A) **Lipids**    B) Carbohydrates    C) **Proteins**    D) Nucleic acids

36. Lipids provide:

- A) Less energy than carbohydrates    B) Equal energy    C) **Twice the energy**    D) No energy

37. The plasma membrane is mainly composed of:

- A) Proteins only    B) **A phospholipid bilayer**    C) Carbohydrates    D) Chitin

38. The molecule that carries genetic information is:

- A) RNA    B) Protein    C) **DNA**    D) ATP

39. Which is NOT a nitrogenous base?

- A) Adenine    B) Guanine    C) Cytosine    D) **Glucose**

40. The modern gene-editing technology is:

- A) PCR    B) Cloning    C) DNA fingerprinting    D) **CRISPR-Cas9**





**Second: Give Reason (10 Questions)**

1. Plants form the base of the energy pyramid.
2. Energy decreases at higher trophic levels.
3. Living organisms cannot live in isolation
4. Decomposers are essential in ecosystems.
5. Deserts have few producers.
6. ATP is called the energy currency of the cell.
7. Lipids are an efficient energy source.
8. Proteins are important for the body.
9. DNA is essential for living organisms.
10. Food web complexity increases ecosystem stability.

**Answer****First: Choose the Correct Answer**

1. D    2-D    3-C    4-B    5-C    6-C    7-D    8-B    9-C    10-D    11-C    12-B    13-B  
14-C    15-D    16-C    17-C    18-D    19-C    20-C    21-C    22-D    23-B    24-B    25-C    26-C  
27-C    28-B    29-D    30-B    31-C    32-B    33-C    34-D    35-C    36-C    37-B    38-C    39-D    40-D

**Second: Give Reason**

- 1- Because they convert solar energy into chemical energy.
- 2- Because most energy is lost as heat and in life processes.
- 3- Because they depend on biotic and abiotic factors.
- 4- Because they recycle nutrients back to the environment.
- 5- Due to water scarcity and extreme heat.
- 6- Because it provides energy directly for cellular activities.
- 7- Because they release more energy than carbohydrates.
- 8- Because they build tissues and act as enzymes.
- 9- Because it carries hereditary information.
- 10- Because organisms depend on multiple food sources.







# Lesson Two Vital processes in living organisms and the stability of the biosphere

Living organisms need a delicate system that ensures the movement of essential materials within them, such as water, salts, oxygen, and nutrients. Transport, respiration, and excretion are among the most important vital processes that maintain this balance.

Transport provides each cell with the materials it needs, while respiration converts the energy stored in those materials into energy used to perform various vital activities. In excretion, the organism gets rid of waste products resulting from vital processes.

Through this integration, living organisms contribute to the stability and balance of the biosphere, recycling materials and energy in a way that sustain...

## **First: Transport in Living Organisms and its Role in the Distribution of Materials and Energy**

### **1. Vascular vessels in plants**

a- Higher plants possess transport systems that enable them to move water, salts, and manufactured nutrients within their vascular tissues, although they lack a specialized organ to propel them like the heart in humans. These systems are the xylem and phloem tissues:

### **Xylem tissue Transporting some raw materials for the photosynthesis process**

absorbed mineral salts from the soil to the leaves, where photosynthesis takes place.

#### **Structure xylem tissue,**

**A- tracheids** hollow tubes extending from the roots to the leaves. which are dead cells in the mature plant to facilitate water passage

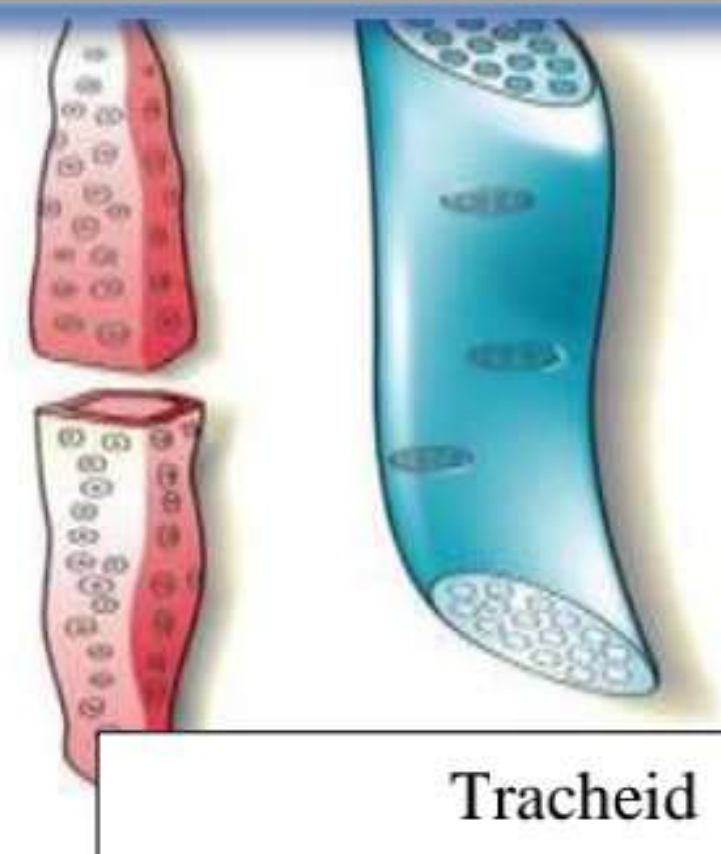
The walls of the xylem vessels are supported by a hard substance ( lignin.)

**Lignin** a substance that gives the vessels

A-strength and rigidity and prevents their collapse

B-helps resist compression,

C- allowing the vessels to maintain their shape even in the tallest plants



Tracheid







**Water and mineral salts move through the xylem vessels in one direction,** from the roots to the leaves, relying on the unique physical properties of water molecules.

**In the xylem vessels,** water moves in a continuous column from the root to the top of the plant.

**Explains how water rises against gravity.**

### **The theory of cohesion and adhesion**

#### **Cohesion and Adhesion Theory:**

This theory is based on three types of fundamental forces:

**1. Cohesive forces:** These are the forces that **bind water molecules together due to hydrogen bonds**, keeping the water column in the wooden vessels cohesive as it moves.

**2. Adhesive forces:** the **attractive forces between water molecules and the walls of the wooden vessels, helping to stabilize the water column as it rises.**

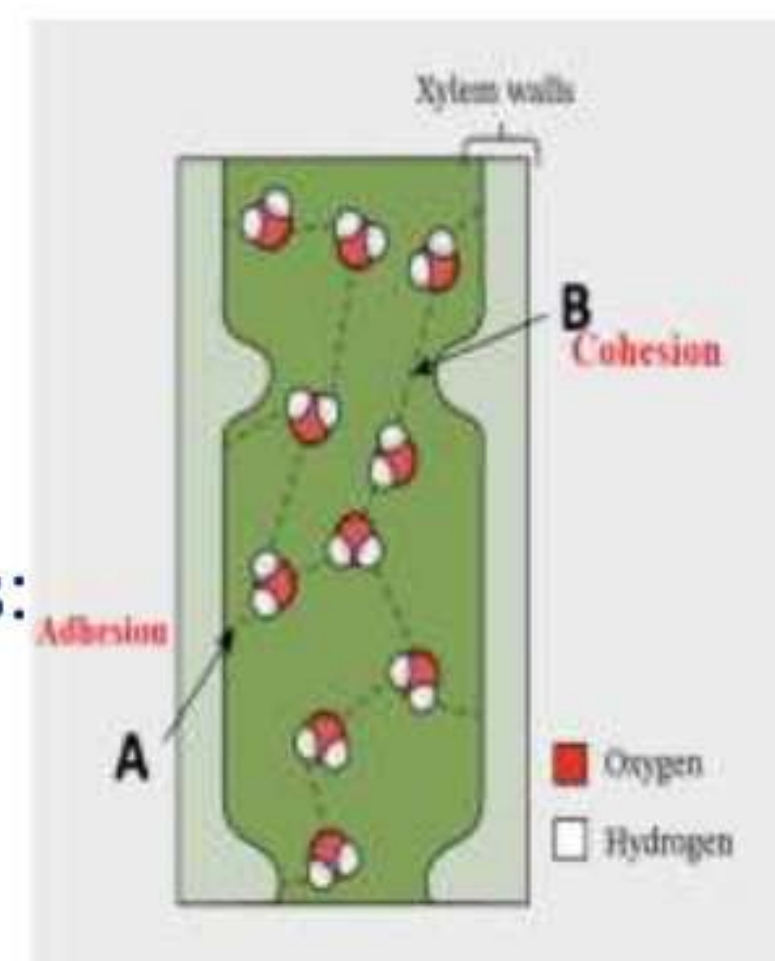
**3. Transpiration Pull:** The **loss of water vapor from leaves through the stomata** during transpiration reduces the number of water molecules in the leaf cells. **This causes the water pressure in the leaf to become lower than that in the stem or root, i.e., negative.** **This creates a pulling force** known as "transpiration," which pulls the column of water connected in the xylem vessels upwards.

N.B ;

Water and mineral salts move continuously from the root to the stem and leaves. Therefore, a tall plant like a pine tree can lift water tens of meters without a pump.

#### **The role of the transpiration process**

- 1- Getting rid of excess water or regulating the temperature of the plant,
- 2- It also contributes to adding water vapor to the atmosphere,
- 3- Contributes to the formation of clouds and rainfall as part of the water cycle in nature.





## Phloem tissues Transporting the products of photosynthesis as an energy source in the biosphere process

**Phloem tissue** : transports the products of photosynthesis, ( glucose - amino acids) from the leaves to all parts of the plant, including roots, fruits, and seeds.

### Structure phloem tissue,

1- **Sieve tubes** interconnected living cells known as, which are lined up side by side to form interconnected transport channels.

-Sieve tube cells do not contain a nucleus, but

2-**Companion cells** associated Sieve tubes that supply them with energy and help them regulate the movement of nutrients through the phloem.

This transport occurs in two directions, **upwards** and **downwards**, according to the plant's needs at each stage of growth.

**Sugars are stored in the roots during the winter** and then transported **back to the leaves in the spring** to nourish new growth.

**The plants** an efficient and balanced system for distributing water and energy that ensures their continued life and growth

### Modern technological applications

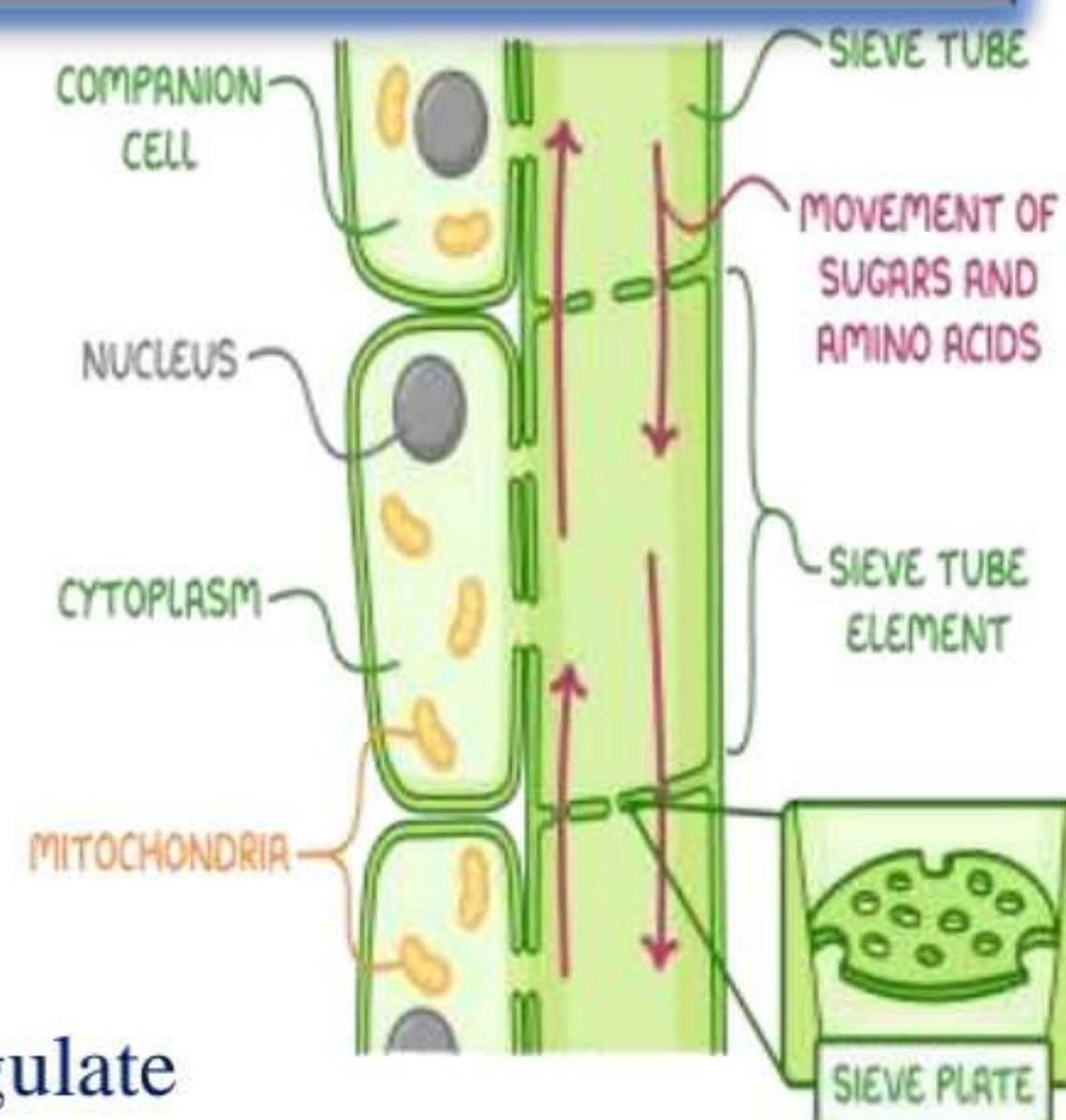
#### Studying fluid movement in plants

1- **Micro-CT scanning**, are used to study the complex mechanisms of water and nutrient transport within the plant with high precision, specifically in the xylem and phloem tissues

2-This technique creates three-dimensional (3D) images of vascular structures, xylem and phloem tissues without destroying the plant specimen.

3-These images allow us to monitor the movement of water through xylem vessels and to check phenomena inside the vessels, such as the formation of air bubbles that impede the continuous upward movement of the water column against gravity.

4-These experiments and applications help to understand the role of cohesion and adhesion in the uplift of water to the tops of trees, providing information for developing drought resistance strategies and improving water use efficiency in agriculture.





**2: The circulatory system in humans and its role in the transport process****Internal transport system**

to ensure that oxygen and nutrients reach all the body's cells.

The circulatory system performs this vital role through an integrated network it consisting of ( heart, blood vessels - blood.)

**The heart**

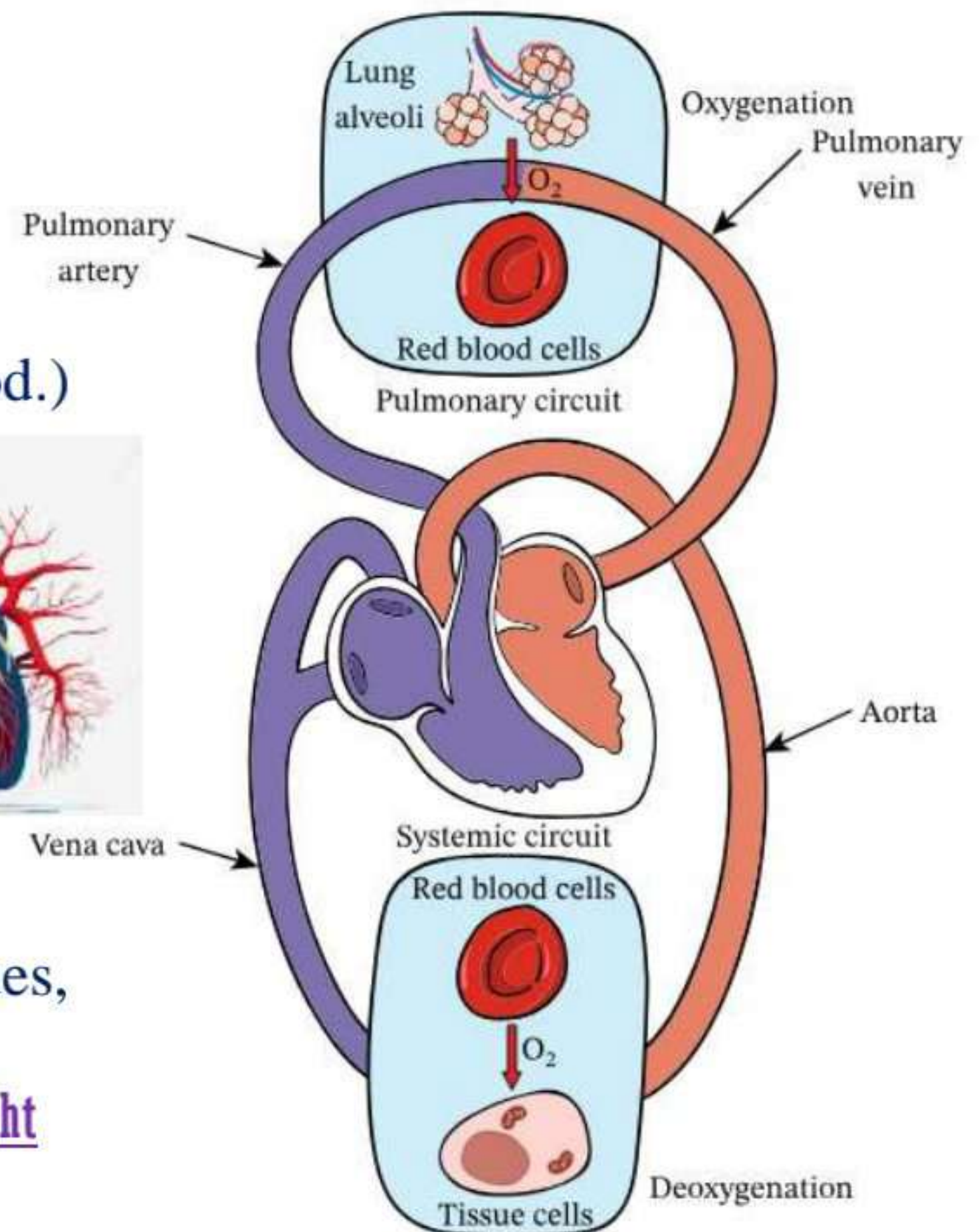
It acts as a powerful muscular pump, propelling blood through two main, complementary cycles.

**1-Systemic Circulation**

Blood rich Oxygen is pumped from the left ventricle through the aorta to all body tissues, while oxygen-poor, carbon dioxide-rich blood returns through the veins to the right atrium, then to the right ventricle.

**2-Pulmonary circulation**

Deoxygenated blood is pumped from the right ventricle to the lungs to supply the red blood cells with oxygen from inhaled air and release carbon dioxide to be expelled from the body with exhaled air. Then the oxygenated blood returns to the left atrium, and then to the left ventricle.

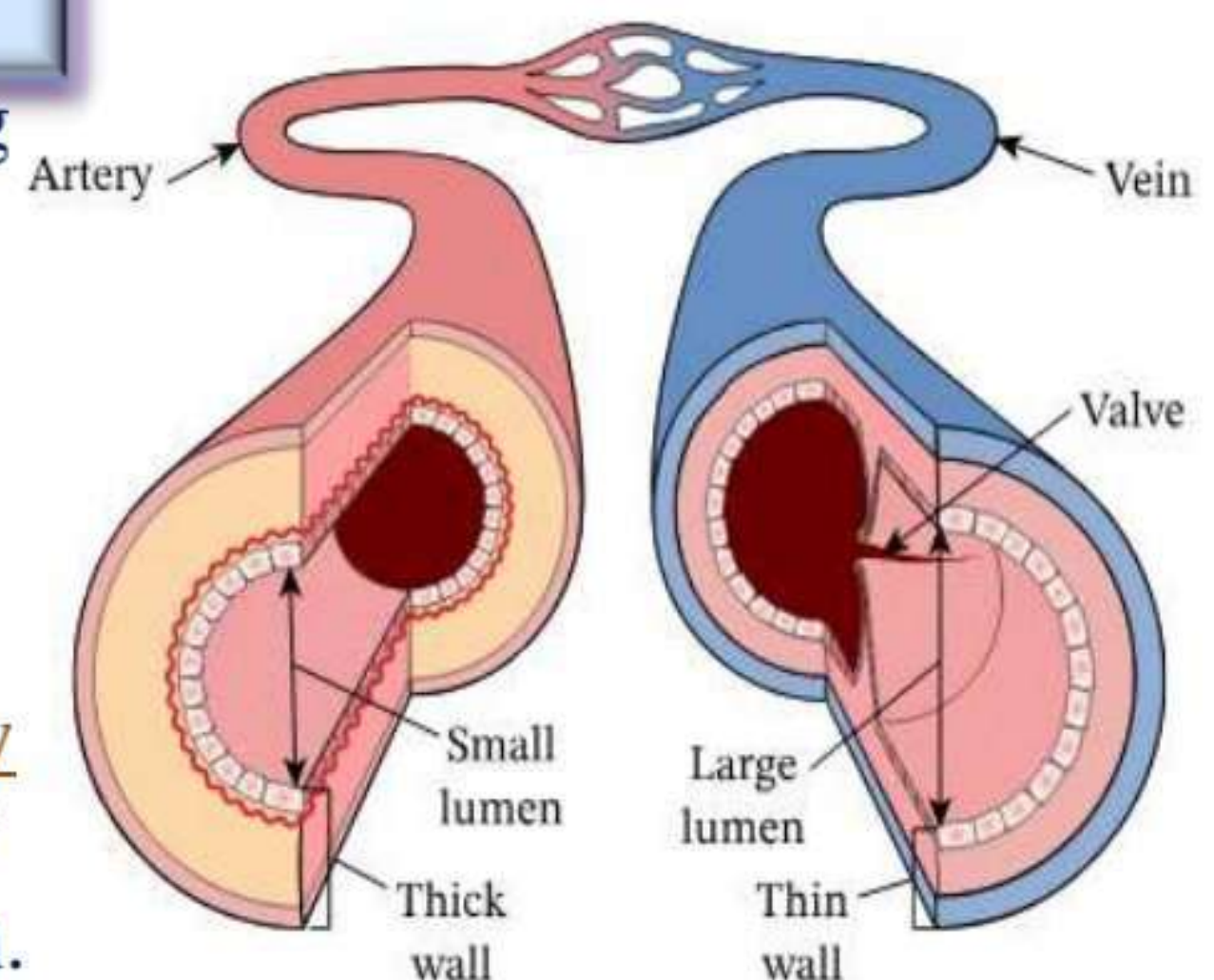
**Blood vessels**

**Blood vessels** are networks for transporting energy and vital substances within a living organism, and are divided into:

**a-Arteries** transport oxygenated blood at high speed and pressure from the heart to different parts of the body.

**B-Veins** return deoxygenated blood from the body to the heart at low pressure, with the help of valves that prevent backflow within the vein.

**c- Blood capillaries** The actual exchange of substances, such as oxygen, carbon dioxide, glucose, and waste products, between the blood and the body's cells takes place in the capillaries







**Circulatory system** is integrated with the **respiratory system**, which supplies the blood with oxygen, and the **excretory system**, which get rid waste.

**During physical exertion**, the respiratory and heart rates **increase respiratory rate** to provide the muscles with more oxygen and energy, and the rate (getting rid sweat) also increases. This is a simple example of **homeostasis** in the body's functioning.

### Blood pressure in humans

The heart's pumping of blood is the vital driving force that ensures oxygen and nutrients reach all cells and tissues.

**As blood circulates** throughout the body, it **exerts pressure on the walls of blood vessels** (arteries and veins).

**This pressure** is **essential for continuous blood flow** and is typically measured as one of two values:



| 1-Systolic pressure                                                                                                                                                                              | 2-Diastolic pressure                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Its normal value is 120 mmHg                                                                                                                                                                     | Its normal value is= 80 mmHg                                                                                                                                              |
| This is the <b>top value of blood pressure</b> and represents the <b>maximum force exerted by the blood</b> on the artery walls during the heart's <b>contraction</b> to pump blood to the body. | This is the <b>bottom value of blood pressure</b> and represents the <b>minimum force exerted by the blood</b> on the artery walls during the heart's <b>relaxation</b> . |

### Blood pressure measurement

The mercury **sphygmo**manometer is the most common device for measuring blood pressure, but digital alternatives are now widely available.



### Physical properties of blood and maintaining normal blood pressure

The blood as a fluid play a main role in maintaining blood pressure at its normal level, **most importantly:**

**1-Viscosity:** **Blood is a viscous fluid (more viscous than water)** **G.R.?** because it contains red blood cells, white blood cells, platelets, and dissolved proteins.

Blood viscosity controls its flow rate.

**1-If blood viscosity increases** (as in cases of dehydration or an increased number of red blood cells), **resistance to flow increases**, causing **pressure increases**.

**3- if viscosity decreases**, blood flows more easily, and blood **pressure decreases**.







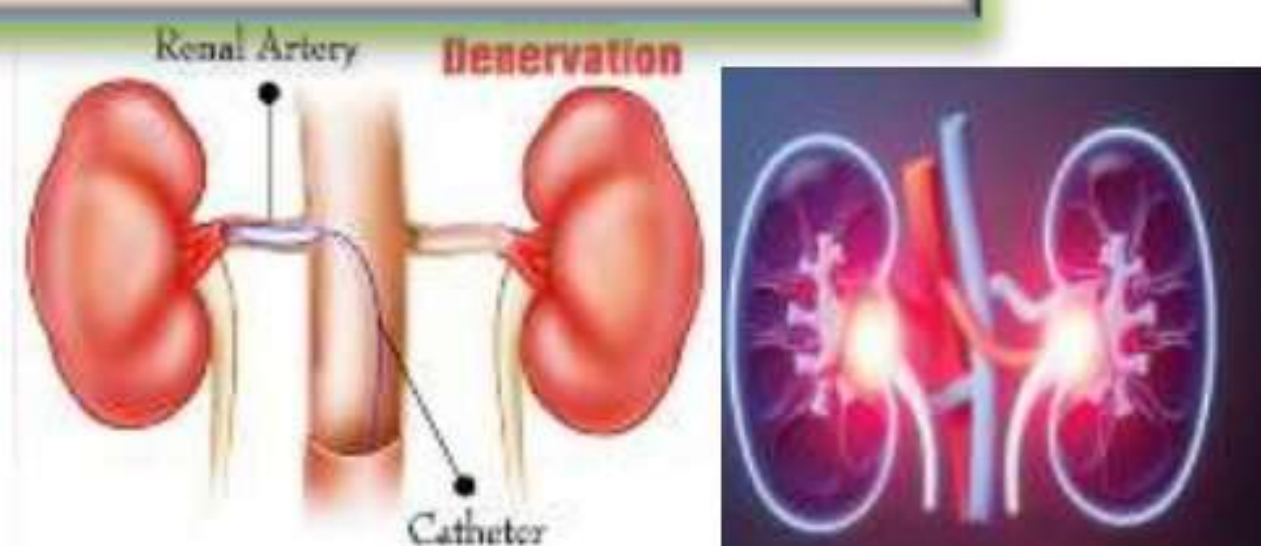
**2-Blood density**, changing by change the proportions of its components (especially hemoglobin), affects the effort required to pump blood.

The elasticity of blood vessel walls during contraction and relaxation, and the force of the heart's pumping action, and affect the vital pressure.

**Modern physical applications for treating high blood pressure:**

**RENAL DENERVATION** استئصال العصب الكلوي

Renal denervation is one of the latest techniques that helps stabilize blood pressure in patients who do not respond to medication.



This technique is a simple, non-surgical medical intervention that uses high-frequency radiofrequency energy or ultrasound to inhibit or disable the active nerves around the kidney that send nerve signals leading to excessively high blood pressure.

Thus, advanced physical applications can contribute to protecting human health and supporting stability within the biosphere.

**Second: Breathing and obtaining energy**

**Cellular Respiration**

Every cell in a living organism needs a energy to carry out its vital activities, from transporting materials across membranes to division and growth.

Cells obtain this energy from the process of cellular respiration

**Cellular Respiration**

It is a **series of chemical reactions** that release the chemical energy stored in glucose and store it as usable energy in the form of ATP

**The process**

1- **Glycolysis** the 1<sup>st</sup> stage in the cytoplasm where one glucose molecule is broken down and a small amount of energy is produced in the ATP molecules.

2- **Aerobic respiration** takes place in the presence of oxygen in the **mitochondria**

Which consider "**powerhouses**," of the cell's where, producing CO<sub>2</sub>, water, and a large amount of ATP.

The reaction that occurs in aerobic cellular respiration

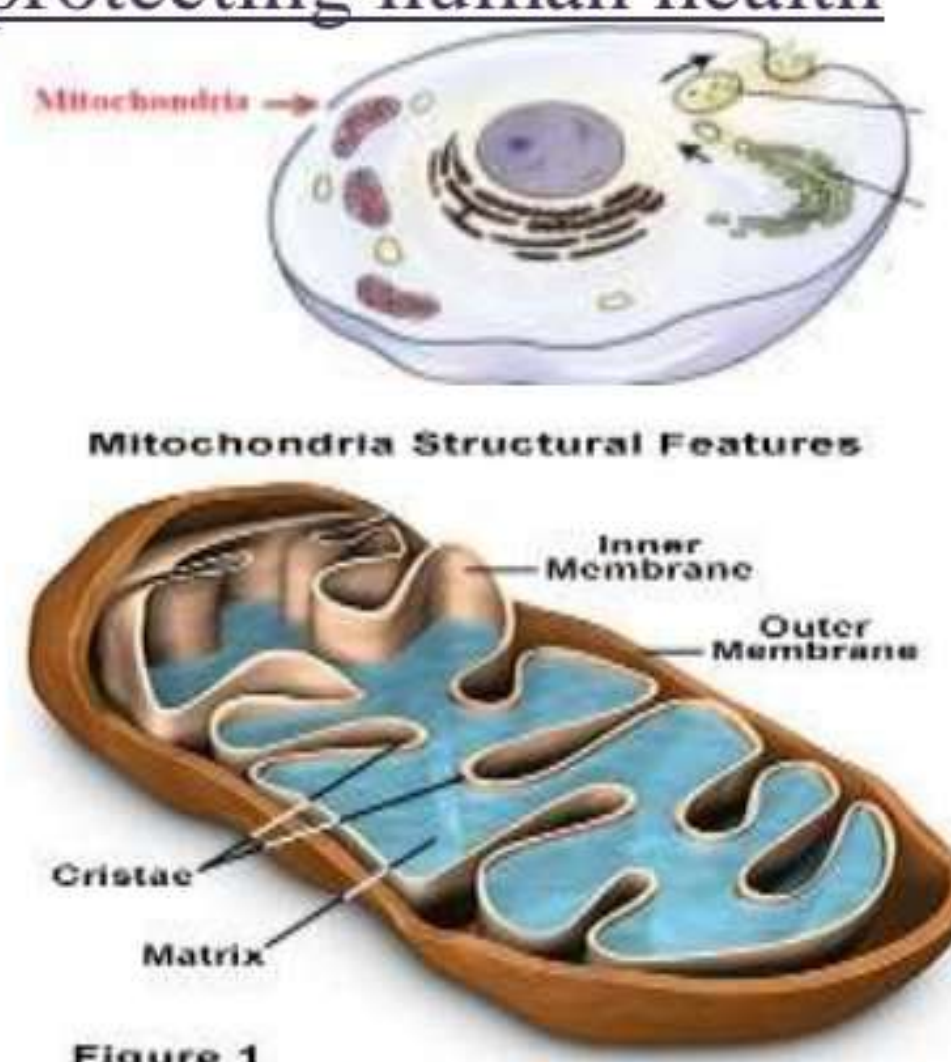


Figure 1







The law of conservation of energy is fulfilled in chemical reactions, where Energy is transformed from one form to another without being created or destroyed.

The chemical energy stored in glucose (food) and oxygen is converted into energy stored in carbon dioxide and water molecules, into chemical energy stored in ATP molecules, in addition to energy released

cellular respiration is divided

Depending on the availability of oxygen, two types:

| <u>1-Aerobic Respiration</u>                                                                                                                                                                                     | <u>2-Anaerobic respiration</u>                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This occurs under conditions where oxygen is available. Aerobic respiration is the most efficient for energy production, as it produces approximately 36 molecules of oxygen from one glucose molecule. from ATP | The cell switches to this process in the absence of oxygen. It is less efficient in producing energy, as it produces limited energy (only about two ATP molecules) with the formation of byproducts such as lactic acid in muscle cells, or alcohol in yeast. |

For example, when do hard exercise, the oxygen available in the muscles for energy production decreases, so the cells temporarily resort to anaerobic respiration, which leads to the accumulation of lactic acid in muscle tissues and a feeling of muscle fatigue.

Reaction: Lactic acid fermentation



Reaction: Alcoholic fermentation



In cellular respiration processes, chemical reactions occur that result in the release of energy, and this type of chemical reaction is known as an exothermic reaction







## Energy and chemical reactions

In a chemical reaction, bonds are broken in the molecules of the reactants and new bonds are formed in the molecules of the products.

This process involves:

1-The consumption of energy to break the chemical bonds between the reactant molecules.

2-The release of energy as a result of the formation of new bonds between the molecules of the products.

### 1-Exothermic reactions

The product molecules have less stored energy ( $E_P$ ) than the reactant molecules ( $E_R$ ), **Its mean that** energy is released during these reactions.

This thermal energy is released into the surrounding environment, causing increase the surrounding temperature.

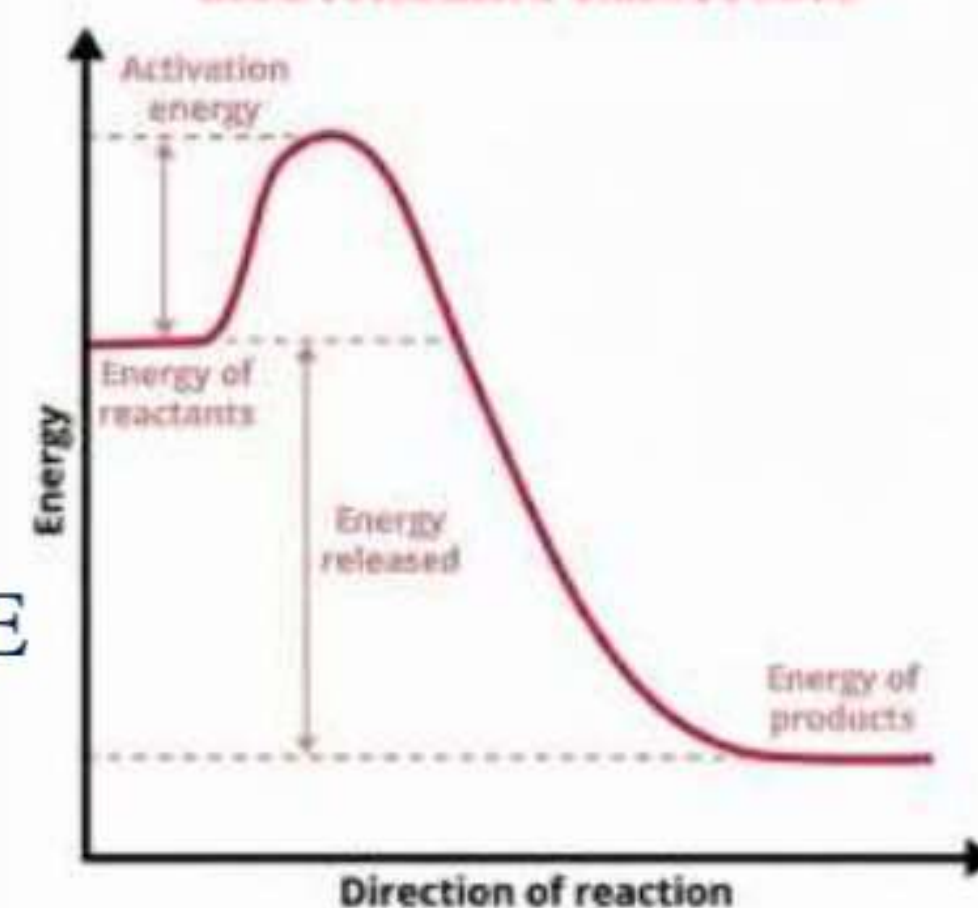
Example

When you add hydrochloric acid solution to sodium hydroxide solution (an alkali) in a glass flask, you will feel warmth or heat when you touch the container.

The reaction is an exothermic reaction,



**EXOTHERMIC REACTION**



### 2- Endothermic reactions

The product molecules have more stored energy ( $E_P$ ) than the reactant molecules ( $E_R$ ), **Its mean that** energy needs to be absorbed during these reactions.

These reactions require large activation energy to occur.

This energy is obtained by the reactants through heating or from the surrounding environment, which decrease the temperature

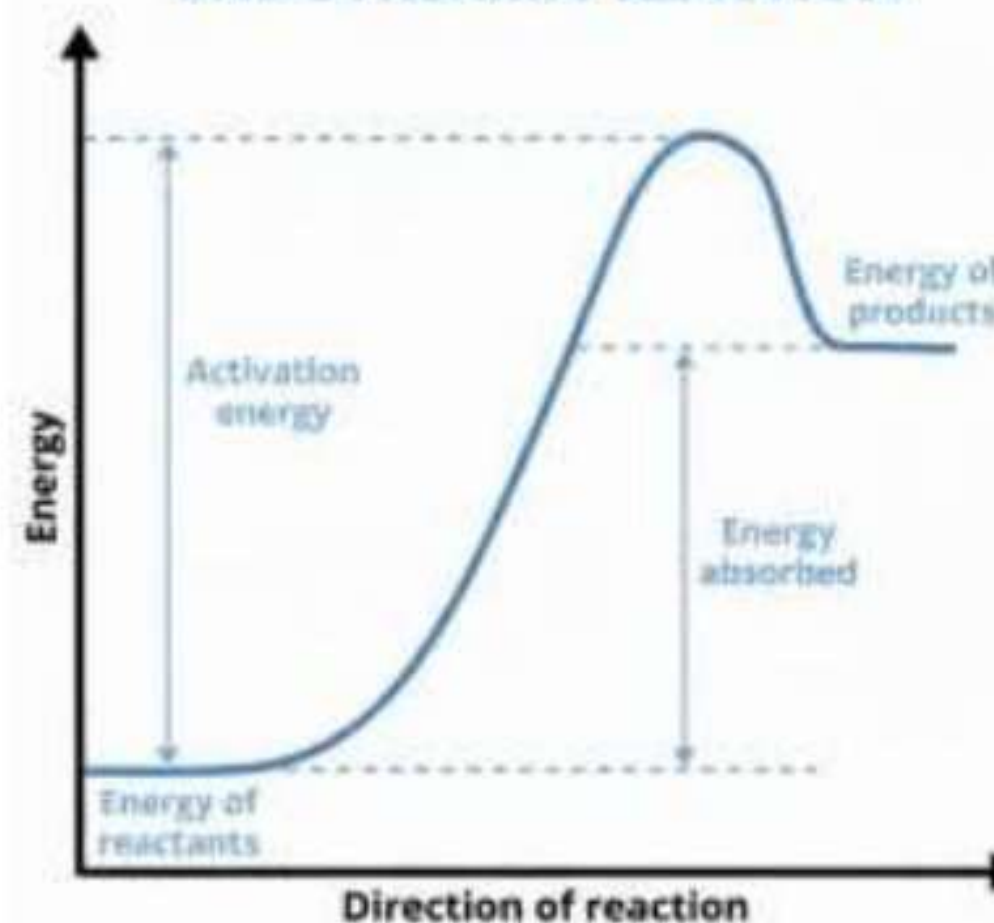
Example

1-Photosynthesis in plants is an example of an endothermic reaction, where the plant absorbs light energy from the sun to convert carbon dioxide and water into glucose and oxygen.

2-The decomposition of solid potassium chlorate by heat into potassium chloride and oxygen gas.



**ENDOTHERMIC REACTION**







## Calculating the amount of heat released or absorbed during a reaction (heat change)

To know the amount of heat released or absorbed during the reaction, or the heat change ( $\Delta H$ ) associated with the reaction?

To calculate the heat change ( $\Delta H$ ) associated with a chemical reaction, follow these steps:

### 1-Verifying the law of conservation of mass in the reaction

A chemical reaction can be expressed by a symbolic chemical equation showing the reactants and products.

The chemical equation must be balanced to satisfy the law of conservation of mass (matter), which states that the sum of the masses of the reactants equals the sum of the masses of the products

**Example: Water formation reaction**



one molecule of oxygen reacts with two molecules of hydrogen to form two molecules of water.

Practically chemists express the amount of reactants and products in moles (mol).

A mole is a quantity of a substance whose mass in grams is equal to its molecular mass.

**Example** The mass of one mole of hydrogen ( $\text{H}_2$ ) is 2g, its atomic mass is 1;

The mass of one mole of oxygen ( $\text{O}_2$ ) is 32g, where its atomic mass is 16

mass of one mole of water ( $\text{H}_2\text{O}$ ) is  $18\text{g} = 16 + 1 \times 2 = 18$



**In moles:** We find that 2 moles of water are produced from the reaction of 1 mole of oxygen with 2 moles of hydrogen.

**By gram :**  $4 \text{ gm} + 32 \text{ gm} = 36 \text{ gm}$

the total mass of the reactants equals the total mass of the products, despite the release of energy in the form of heat.

**the law of conservation of mass,** the mass is neither created nor destroyed during a chemical reaction, but rather transformed from one form to another. The presence of heat as a product does not imply a loss of mass, because heat represents energy, not matter, and therefore is not included in the calculation of mass.

### 2- Calculating heat content of products and reactants:

The heat content ( $H$ ) of a substance :is the amount of chemical energy stored in one mole of that substance, and its unit (kJ/mole)







The change in heat content ( $\Delta H$ ) is the difference between the total heat content of the products ( $H_P$ ) and the total heat content of the reactants ( $H_R$ ).

$$\Delta H = H_P - H_R$$

1. If  $H_R < H_P$ ,  $\Delta H$  is positive, and the reaction is endothermic.
2. If  $H_R > H_P$ ,  $\Delta H$  is negative, and the reaction is exothermic.

Example :

The equation illustrates the complete combustion reaction of a type of alcohol



1. Is this reaction endothermic or exothermic? Why?
2. Calculate the amount of heat released (in kJ) from the combustion of 80 g of methanol.  
Given that (C = 12, H = 1, O = 16)

Solution:

Since  $\Delta H$  is negative, this means that the heat content of the products is less than the heat content of the reactants.

The difference between them is released to the surrounding environment, meaning the reaction is exothermic.

2. Calculate the amount of heat released from the combustion of 80g of methanol

a- Calculate the molar mass of methanol

$$1- M(\text{CH}_3\text{OH}) = 12 + 3 \times 1 + 16 + 1 = 32 \text{ g.}$$

b- Calculate the number of moles n that corresponds to the given mass:

$$n(\text{CH}_3\text{OH}) = 80 \div 32 = 2.5 \text{ mol}$$

c- Calculate the amount of heat released from the combustion of 2.5 moles of  $\text{CH}_3\text{OH}$

From the chemical equation:

$\therefore$  Burning 1 mole of methanol gives  $-726.5 \text{ kJ}$

So Burning 2.5 moles of methanol gives

$$\Delta H = -726.5 \times 2.5 = -1816.25 \text{ kJ}$$







## Chapter One (3) Lesson (2)

### Choose the correct answer

### Choose the correct answer

1-If blood viscosity increases so resistance to flow

a- increases    b- decrease    c- not change    d-not sure

1-If blood viscosity decreases so resistance to flow

a- increases    b- decrease    c- not change    d-not sure

3-Systolic pressure is a- 100    b- 120    c- 80    d-90    mmHg.

4-Diastolic pressure: a- 100    b- 120    c- 80    d-90    mmHg.

5-Blood density, which varies depending on the proportions of its components especially

a- blood    b- Red b.c    c- white b.c    d-hemoglobin

6-Every cell in a living organism needs a constant supply of energy to

a-carry out its vital activities    b-stop vital activities

c-not change    d-decrease vital activities

### 7- Cellular Respiration

It is a series of chemical reactions that release the chemical energy stored in glucose and store it as usable energy in the form of

a-ATP    b-ATM    c-ATN    d-AMP

8-The process begins in the cytoplasm with a stage known

a-ATP    b-ATM    c-ATN    d-glycolysis

9- ATP then the breakdown products move to the mitochondria , which are the cell's a-

ATP    b-ATM    c-ATN    d-powerhouses

10- The law of conservation of .....is fulfilled in chemical reactions

a-energy    b-charge    c-mass    d-momentum .

11- Aerobic Respiration: This occurs under conditions where oxygen is available. as it produces approximately..... molecules of oxygen from one glucose molecule. from ATP

a-36    b- 40    c-46    d-39

12- The cell switches to this process in the absence of oxygen is called

a- Anaerobic respiration    b- Aerobic Respiration    c-respiration    d- not sure

13-Aerobic Respiration: it produces 36 molecules of oxygen from one glucose molecule. from

a-ATP    b-ATB    c-AFP    d-PTB

14- It turns out that in cellular respiration processes, chemical reactions occur that result in the release of energy, and this type of chemical reaction is known..... reaction

a- exothermic    b-Endothermic    c-(a and b)    d-no

15-In a chemical reaction, bonds are a-broken    b-formed    c- (a,b)    d-no change . in the molecules of the reactants

16-HCl (aq) + NaOH(aq)  $\longrightarrow$  H<sub>2</sub>O(l) + NaCl(aq) + E is called

a-Endothermic R    b-Exothermic R    c-not R    d-not sure







- 15- The unit of heat content is \_\_\_\_\_ a-  
kJmole b- kJ/mole c- kJ d- mole/J
16. The movement of water in xylem vessels depends on physical forces, the most important of which are:  
a) Cohesion and adhesion only b) Cohesion, adhesion, and tensile forces resulting from transpiration c) Active energy transport  
d) Tensile forces resulting from transpiration only
- 17- The presence of lignin in the walls of xylem vessels helps in:  
a) Storing organic materials  
b) Giving cells flexibility and elasticity  
c) Resisting tensile pressure during water ascent  
d) Regulating stomatal openings
- 18- Which of the following is an example of active transport in a cell?  
A) Transport of oxygen across the cell membrane  
B) Osmosis of water  
C) Transport of ions from a lower to a higher concentration in root cells D) Diffusion of gases from the lungs to the blood
- 19-. Transport in plants and transport in humans share the following characteristics:  
a) They occur in one direction  
b) They aim to distribute materials and energy within the body  
c) They depend on lignin  
d) They depend on transpiration
- 20- In the human circulatory system, digested nutrients are transported to cells via:  
A) capillaries B) arteries  
C) veins D) heart
21. Aerobic cellular respiration in cells produces:  
a) Carbon dioxide, water, and energy b) Alcohol and energy  
c) Lactic acid only d) Energy without other products
22. Mitochondria are the primary site in the cell for: a) Photosynthesis b) Aerobic respiration c) Protein synthesis d) Lipid storage
23. In the absence of oxygen, some cells use anaerobic respiration to obtain energy. Its products include:  
a) Water only b) Ethanol or lactic acid  
c) Carbon dioxide only d) Additional glucose
- 24-. Which of the following is an exothermic reaction?  
A) Glucose synthesis in photosynthesis B) Glucose breakdown in aerobic respiration C) Formation of glucose molecules  
D) All of the above
25. The relationship between respiration and photosynthesis is that:  
a) The products of respiration are reactants in photosynthesis  
b) Both take place in the mitochondria c) Both require sunlight  
d) Both occur in all living organisms







## Essay questions

- 1-Explain Blood viscosity controls its flow rate.
- 2-Explain Blood density, which varies depending on the proportions of its components (especially hemoglobin).
- 3-Explain :ATP then the breakdown products move to the mitochondria
- 4-Write The reaction that occurs in aerobic cellular respiration can be expressed by the following chemical equation.
- 5-Write Reaction of Lactic acid fermentation ?
- 6-Write Reaction: Alcoholic fermentation
- 5-The mass of one mole of hydrogen ( $H_2$ ) is 2g, where its atomic mass is 1; the mass of one mole of oxygen ( $O_2$ ) is 32g, Find atomic mass of water ?
- 6-Explain the following:  
Why does water rise in plants despite the absence of an internal pump?
- 7-Explain Why do plants have two types of vascular tissue (xylem and phloem)?
- 8-Explain Why is aerobic cellular respiration more efficient at producing energy than anaerobic respiration?
- 10-Explain Why is cellular respiration an exothermic reaction?

Answer

a 2- b 3-b 4-c 5-d 6-a 7-a 8- d 9-d 10-d 11-a 12-a 13-a 14- a 15-a  
16-a 17-b

### Essay questions

- 1-Blood viscosity controls its flow rate. 1-If blood viscosity increases (as in cases of dehydration or an increased number of red blood cells), 2-resistance to flow increases, causing high blood pressure. Conversely, 3- if viscosity decreases, 4-blood flows more easily, and blood pressure decreases.
- 2-Blood density, which varies depending on the proportions of its components (especially hemoglobin), affects the effort required to pump blood. In addition to blood properties, the elasticity of blood vessel walls during contraction and relaxation, and the force of the heart's pumping action, also influence this vital pressure.
- 3- ATP then the breakdown products move to the mitochondria , which are the cell's "powerhouses," where aerobic respiration takes place in the presence of oxygen, producing carbon dioxide, water, and a large amount of carbon dioxide molecules.
- 4- $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + E$
- 5-Reaction: Lactic acid fermentation  $C_6H_{12}O_6$   
 $2C_3H_6O_3 \longrightarrow 2ATP$
- 6- Reaction: Alcoholic fermentation  
 $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + 2ATP$
- 7- mass of one mole of water ( $H_2O$ ) is  $18g = 16 + 1 \times 2$







## Lesson Three

# Excretion and Internal Balance and Their Role in the Stability of the Biosphere

### Metabolic Wastes and Excretory Organs and its role in balance of energy

Human body cells perform a huge number of precise biochemical reactions continuously.

دقيق

These reactions enable the body to perform its various functions, such as: obtaining energy from food, building necessary biological molecules, resisting infections, and replacing damaged cells. (metabolic processes)

**Metabolism** includes

Anabolism, where new materials needed by the body are produced,

Catabolism, where complex molecules are broken down to obtain energy.

Metabolic reactions are essential for life, but they do not always produce useful materials.

Metabolic wastes Many of bi-products that the body does not need but leave them behind, and can be harmful if they accumulate.

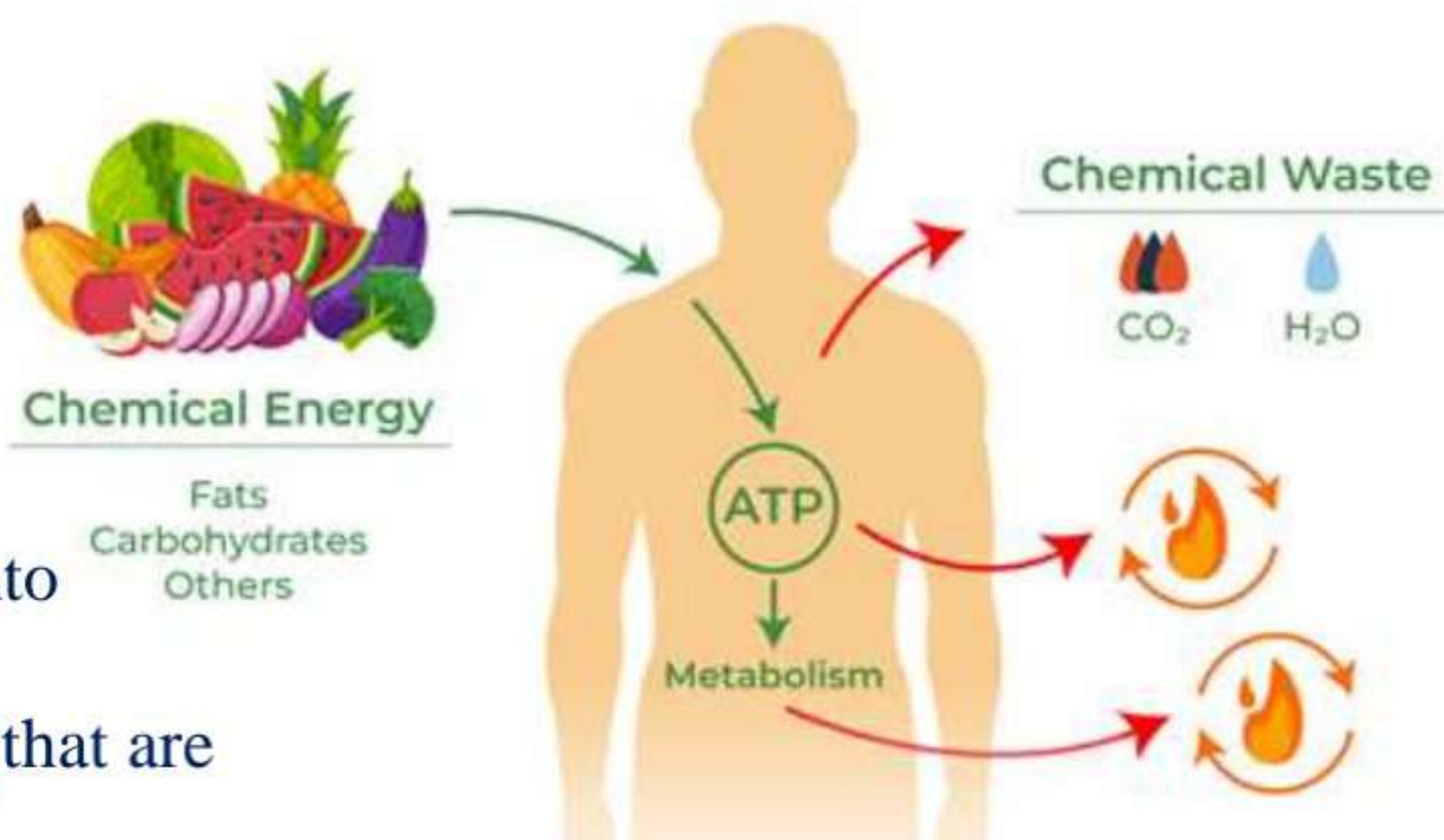
Bi-products include

1- Carbon dioxide produced by cellular respiration,

2- Ammonia produced by the breakdown of amino acids in the liver,

3- Urea that results from converting toxic ammonia into a less harmful form,

4- Excess water and mineral salts that are excreted in various ways.



### [- Metabolic Wastes]

The organism needs a precise mechanism to get rid of Metabolic Wastes (G.R.?).

Because the accumulation of these wastes leads to disruption of the chemical balance of fluids inside the body, and affects the efficiency of cell function,

Excretion process is the biological process through which metabolic wastes are removed from the body, and maintain the internal environment of the body (Homeostasis) التوازن الداخلي







**The kidneys** regulate the concentration of water and ions in the blood,  
**The skin** secretes water and salts through sweat glands to help regulate body temperature,  
**The lungs** expel carbon dioxide and water vapor to the atmosphere,  
**The liver** is a major center for waste processing, as it converts toxic substances into compounds that can be safely excreted.

### **Water and Salt Balance inside the Body**

**The kidneys** are among the most important organs of the excretory system,

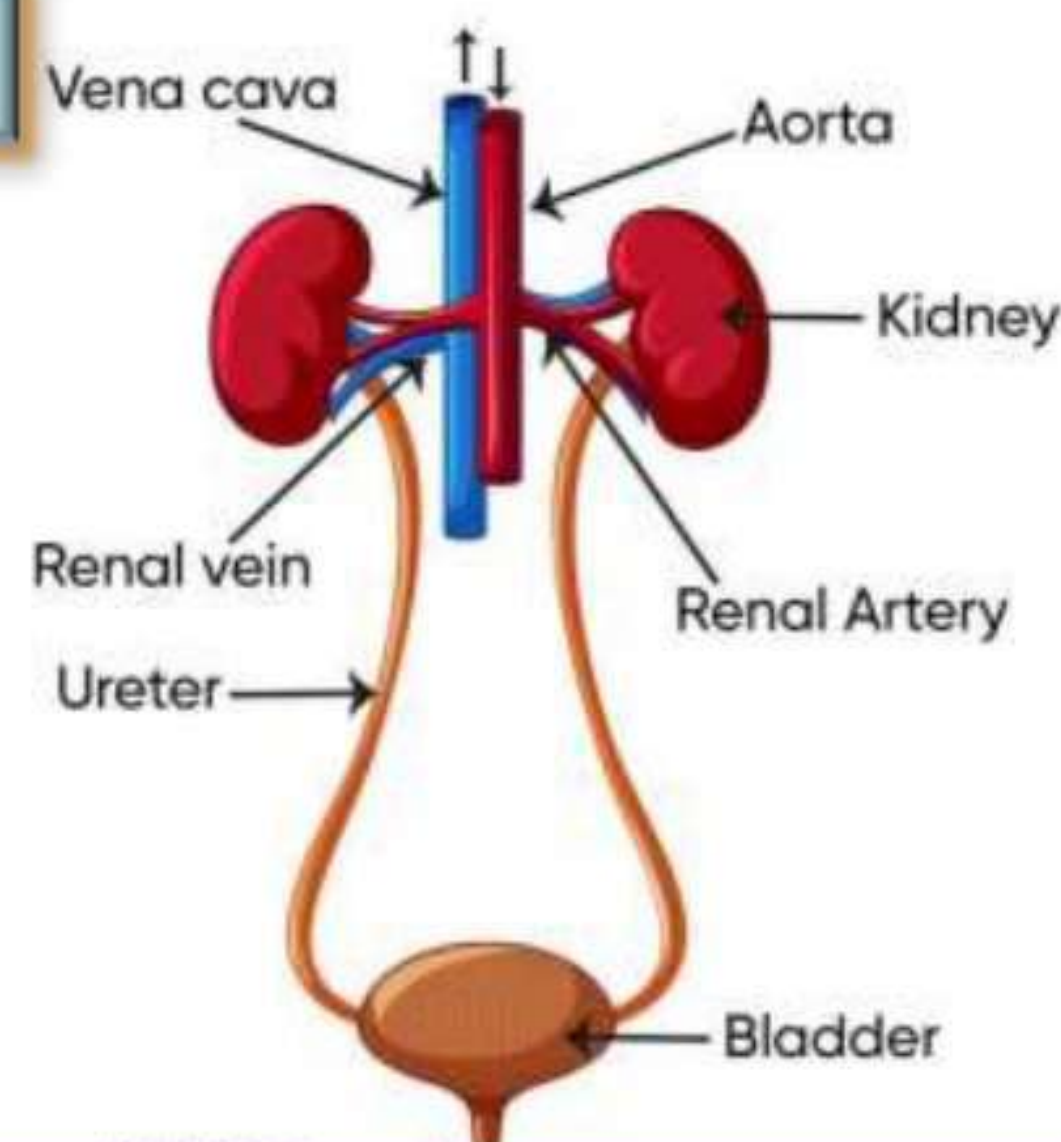
#### **The Function of kidneys**

1- Purify the blood from liquid wastes resulting from vital reactions inside the body.

They produce urine, which is the liquid produced to get rid of excess water, excess salts, urea, and some other dissolved wastes.

**The size of one kidney** is approximately the size of a fist, and its shape resembles a bean,

**Location** located on the two side of the vertebral column in the lower back.



[Diagram of the Urinary System]

**Urine is formed** from filtration of blood inside nephrons (tiny units), where wastes are removed from the blood,

**Reabsorption process** Useful materials such as glucose, ions, and water are returned to the extent needed by the body, to maintain internal balance.

After urine is produced, it moves through the ureters to the urinary bladder, where it is stored until it is expelled outside the body through the urethra.

### **Water and Salt Balance inside the Body**

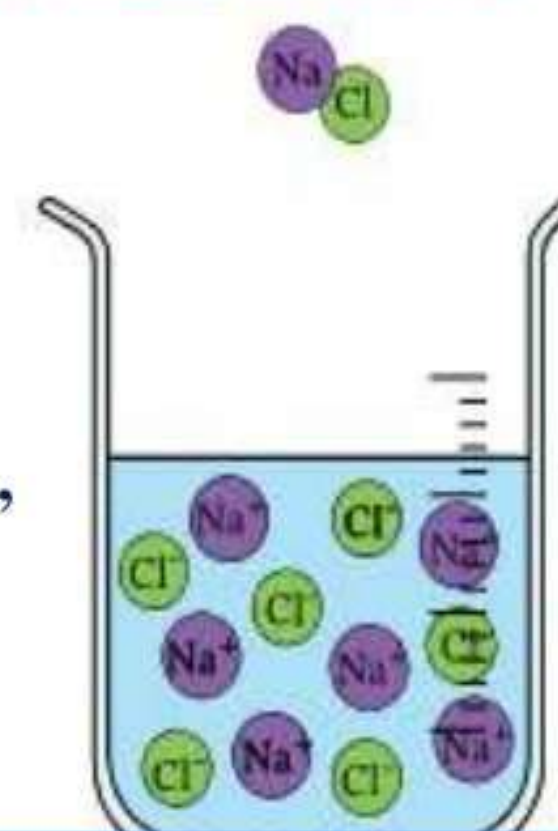
#### **Importance of sodium, potassium, and chloride ions**

- 1- Essential for the function of nerves and muscles,
- 2- Regulating osmotic pressure inside and outside cells.

**What happen when a disturbance occurs in the concentration of these ions,** Biological processes are affected. So, the excretory system - especially the kidneys - regulates this balance with extreme precision.

دقة شديدة

#### **Sodium chloride**



[Concentration of Sodium and Chloride Ions]







### What happen when?

- 1- The concentration of sodium in the blood increases, the **kidneys retain water** to dilute its concentration,
- 2- The concentration of sodium in the blood decreases, the **kidneys get rid more water** is to maintain ionic balance in the body.

**Excretion** contributes to maintaining the balance between ions and water in body fluids, keeping the internal environment stable.

### **Reabsorption**

**Reabsorption** is the process of returning useful materials from the fluid that has been filtered in the nephron back to the blood.

**This occurs** in each nephron, where useful materials pass through the walls of the surrounding cells to the tiny blood vessels.

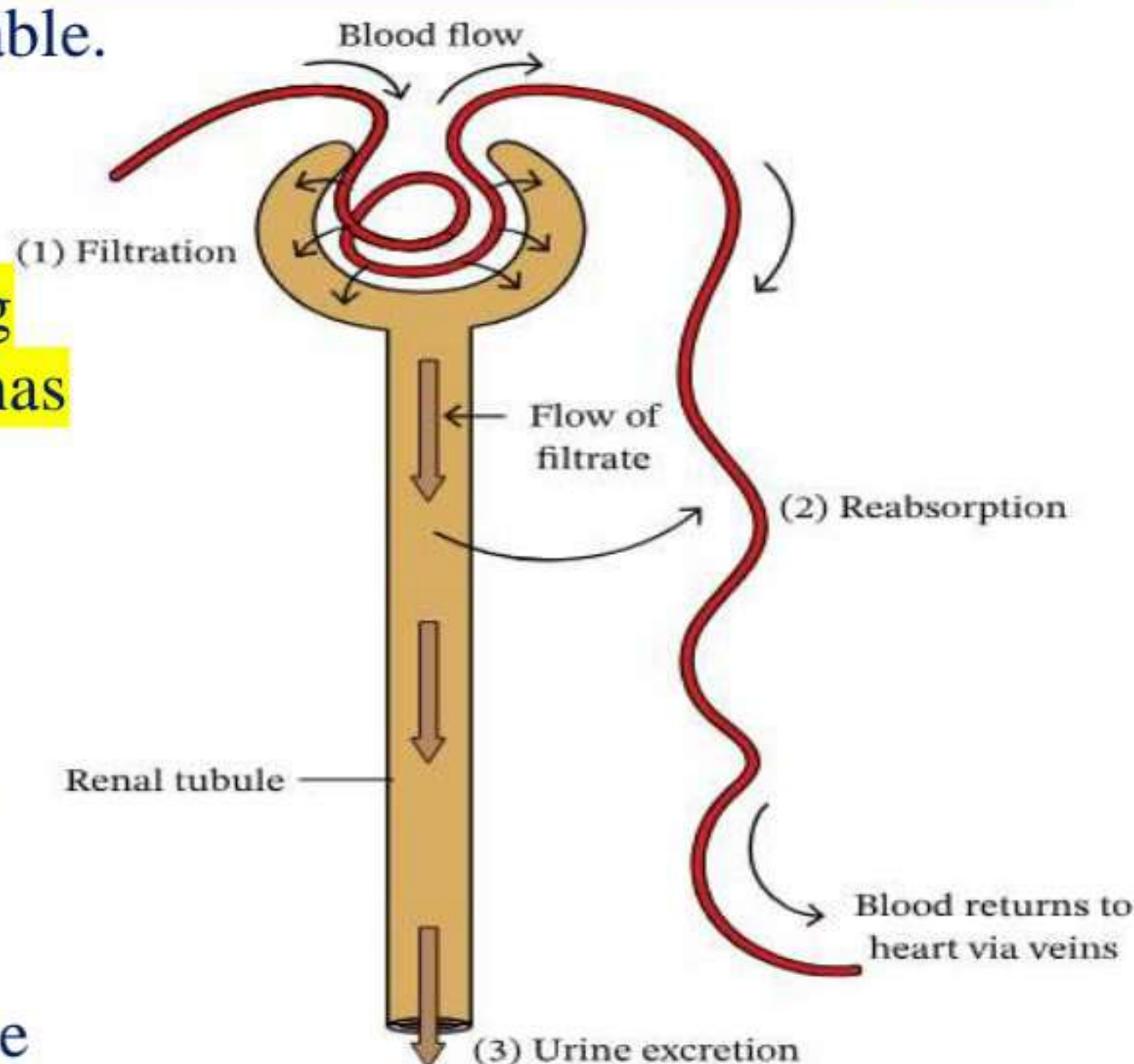
#### During Reabsorption process:

- Most of the glucose is reabsorbed into the blood to provide energy for the cells.
- A large amount of water is reabsorbed to maintain blood volume and fluid balance in the body.
- Important ions such as sodium, potassium, and chloride are also reabsorbed to regulate muscle and nerve functions and maintain blood pressure.
- The materials that the body does not need, such as urea, excess water, and some ions, they are left to be excreted later with urine.

#### Importance of Reabsorption

- 1- Maintaining internal balance (homeostasis) in the body,
- 2- It enables it to control what it retains and what it gets rid of.

**Without reabsorption**, the body would lose large amounts of water and nutrients, leading to severe dehydration, salt disturbance, low blood pressure, and possibly cessation of vital organ functions.



[Simple diagram of a nephron showing the steps of urine production]







## The Skin and Its Role in Excretion and Temperature Regulation

The skin is the outer covering of the body,  
The skin has a dual role (protection - excretion.)

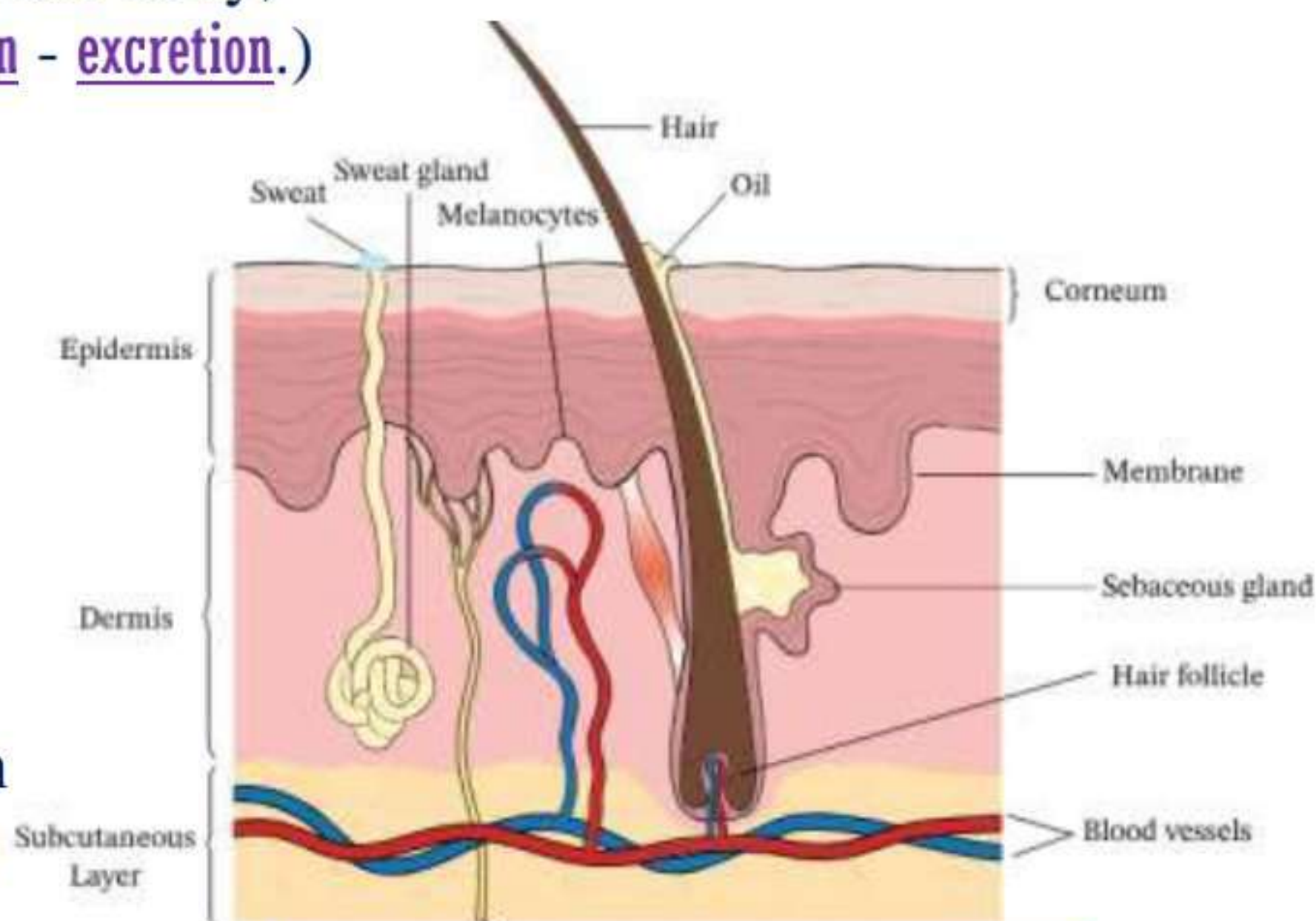
### The skin contains

Sweat glands that secrete sweat,  
[water, mineral salts (NaCl)  
and small amounts of urea]

### Importance of Sweat

1-Regulate body temperature when  
sweat evaporates from the skin  
surface keeping the body at an  
almost constant temperature.

2- Helps maintain the balance of  
fluids and ions inside the body.



[Diagram of Human Skin]

By getting rid of water, salts, and a very small percentage of urea with sweat

The skin Structure The skin consists of three main layers:

- Epidermis: The outer layer that protects the body from microbes and water loss.
- Dermis: Contains sweat glands, hair follicles, and blood vessels that regulate temperature.
- Subcutaneous layer: Rich in fats that act as a thermal insulator.

The integration of the skin with the kidneys in excreting excess water and ions is a  
wonderful example of the integration of excretory organs in maintaining internal balance.

## The Liver and Its Role in Waste Processing

[Diagram showing the liver and gallbladder]

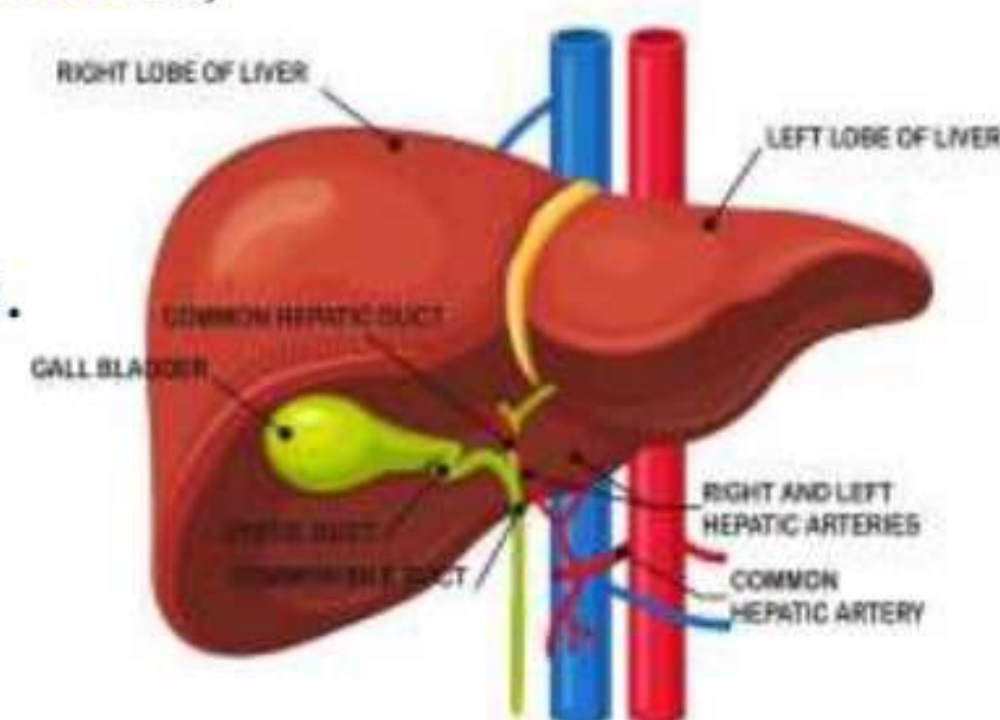
The liver is most important organs in the excretion process,

### The liver function

1- The liver works to purify the blood from harmful  
substances and wastes resulting from vital reactions.

2- The liver maintains the balance of the body's  
internal environment by converting toxic  
substances into safe compounds that the body can  
easily get rid of.

3- The liver acts as a purification center or "treatment station" that protects the  
body from the accumulation of toxins.







The liver helps protect the body from the accumulation of harmful substances in multiple ways

1- Converts toxic ammonia into the less harmful urea which is transferred to the kidneys and excreted with urine.

2- Break down hemoglobin resulting from the breakdown of old red blood cells, producing bilirubin, which is secreted in bile and excreted with feces, while its accumulation leads to jaundice (اليرقان (الصفراء) (البراز)

3- The liver also removes toxins and foreign substances such as drugs and food additives by converting them into less harmful substances before getting rid of them.

4- Bile helps get rid of some water-insoluble wastes such as excess cholesterol and some pigments, contributing to maintaining the internal balance of the body.

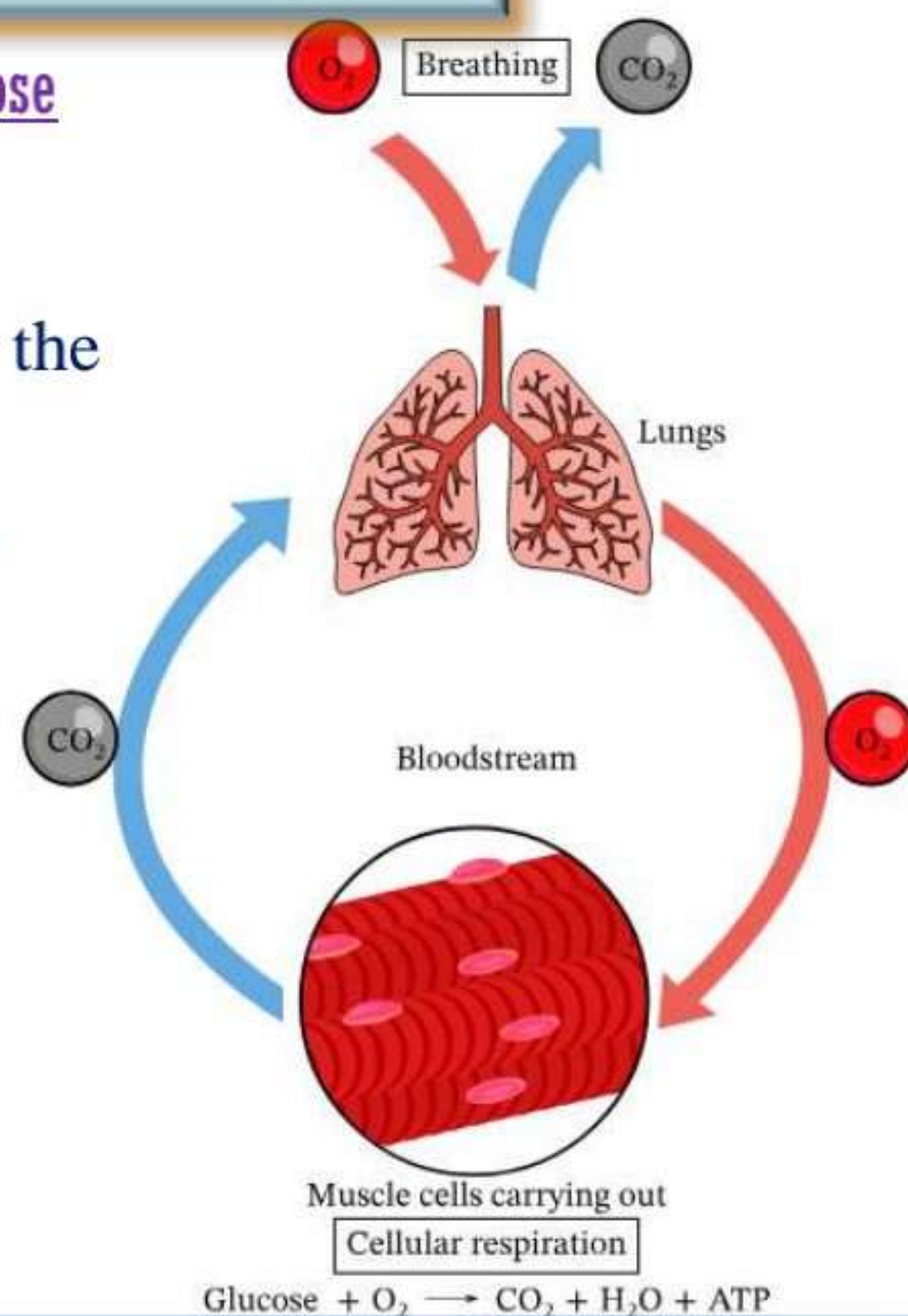
### The Role of the Lungs in Excreting Gaseous Wastes

In cellular respiration, body cells use oxygen and glucose to produce energy, resulting ( water and carbon dioxide) Carbon dioxide moves from the cells to the blood, which carries it to the lungs to be expelled outside the body with exhaled air.

The exhalation process is part of the excretion process, as it rids the body of gaseous wastes.

The accumulation of carbon dioxide gas in the blood increases the acidity of the blood, which disrupts the work of enzymes and threatens vital processes. يهدد العمليات الحيوية

Regular breathing is necessary to maintain the balance of gases in the blood, and thus the internal balance of the body.



[The role of the lungs in excretion]

### Technological Applications

#### The Bio-artificial Kidney

The bio-artificial kidney (renal simulation devices).

Its function modern technological applications for treating kidney failure

This kidney works inside the patient's body or is implanted in it, and aims to perform the functions of a natural kidney.

The basic physical principle in its operation is filtration,



[Artificial Kidney]







**Filtration** blood fluid passes through fine semi-permeable membranes that

- 1- Allow small molecules and wastes to pass to a cleaning fluid or to the other side of the membrane,
- 2- Preventing the passage of proteins and large blood cells

**As for the biological aspect**, it relies on cell engineering;

**The bio-artificial kidney** contains **specialized cells** (taken or laboratory engineered) that **do same of the biochemical functions of the kidney**, such as adjusting the levels of certain salts and secreting important compounds.

**With the presence of these cells** along-side the **filtration units**, more precise monitoring of the balance of substances in the blood is achieved.

### Physics of Ultrasound in the Kidneys and Bladder:

**Ultrasound devices (high-frequency)** are used to picturing excretory organs and diagnose stones or infections. **They depend on the properties of sound waves** such as reflection and refraction to form an accurate image of the condition of internal organs without the need for surgical intervention.



حنود

• **Wave reflection:** Ultrasound waves collide with the boundaries between different tissues (such as the bladder wall or the surface of a stone), and part of them bounces back. The strength of bounce depends on the acoustic resistance of the tissue.

المقاومة الصوتية

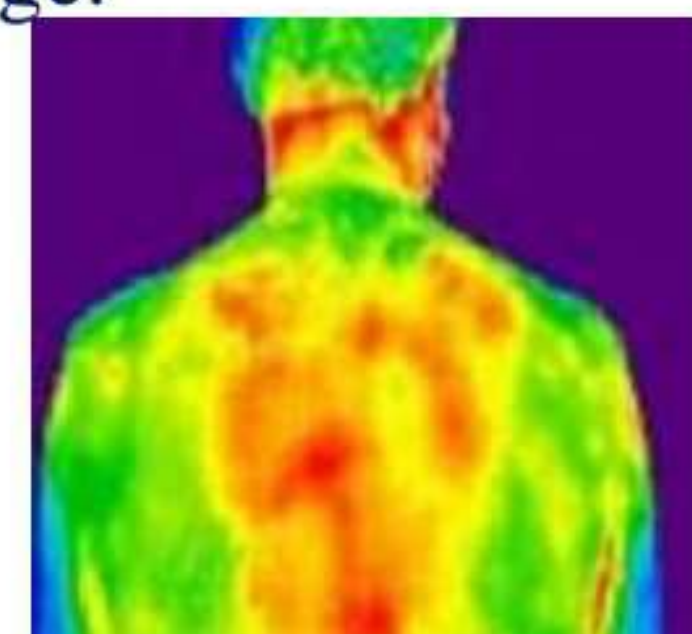
• **Wave scattering:** Occurs when waves collide with irregular surfaces or small particles inside tissues, helping to show details of the organ's texture.

نسيج العضو

• **Digital processing:** The device calculates the time taken for the echo to return, and through the speed of sound in tissues, determines the depth and location of the organ with precision and converts it into a digital image.

### Thermal Physics and the Function of Sweat Glands:

**The sweating process** depends on absorbing an amount of **body heat to evaporate sweat**, (thermal balance and evaporation.) **Infrared thermography devices** are used to **analyze the rate of heat loss through the skin**, helping to monitor the internal thermal balance of the body.







## Element Cycles in the Biosphere

Excretion processes and how they contribute to maintaining internal balance inside living organisms,

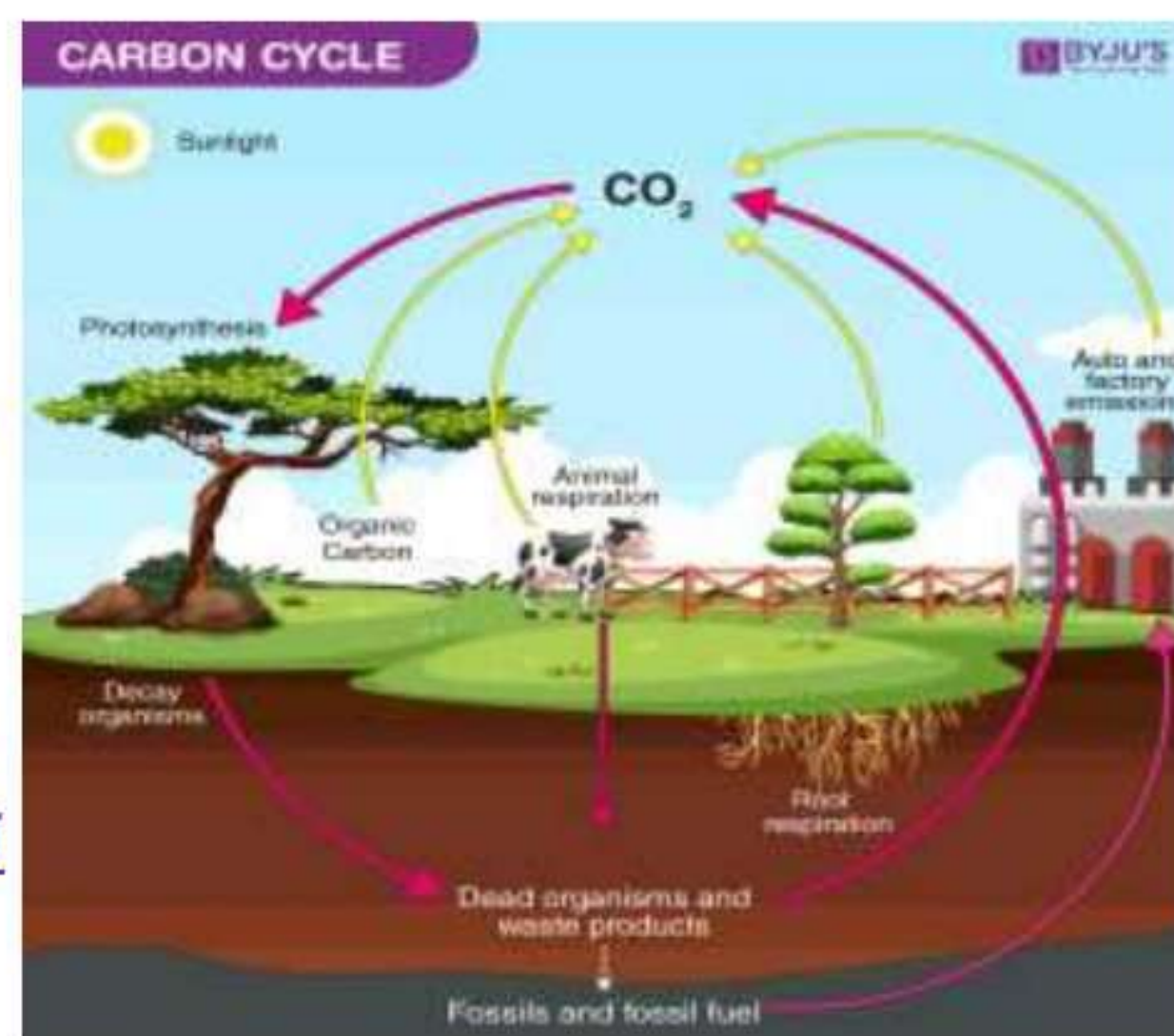
How this balance extends to include the all ecosystem.

Just as the body's organs work together to maintain its internal balance, the elements of the biosphere - such as water, carbon, and nitrogen - work in continuous natural cycles that ensure the continuation of life on Earth.

Among the most important of these elements: carbon, nitrogen, and phosphorus, which enter into successive cycles where they move between air, water, soil, and living organisms.

### Carbon Cycle

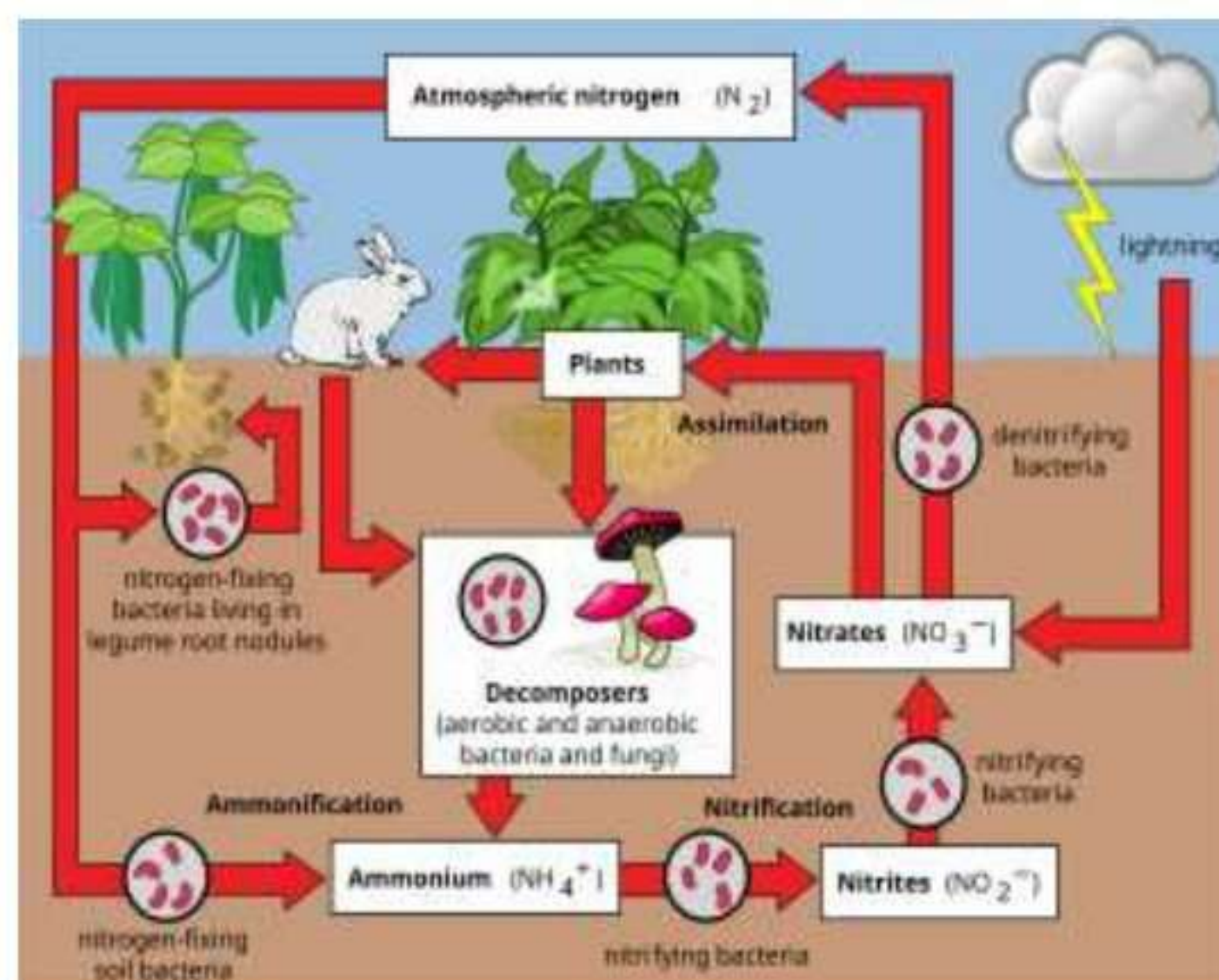
Green plants absorb carbon dioxide gas from the air during the process of photosynthesis to produce food, and then carbon-containing compounds move to animals when they feed on plants. When living organisms breathe or decompose, carbon dioxide gas returns to the air again. In addition to carbon oxides emitted from factories and fuel combustion.



### Nitrogen Cycle

Nitrogen represents a basic component of proteins inside the bodies of organisms.

The nitrogen cycle begins with the fixation of atmospheric nitrogen by a type of bacteria present in the soil, converting it into compounds that can be absorbed by plants.



These compounds move to animals through food, and then return to the soil again through waste or dead organisms, where types of bacteria reconvert them to nitrogen gas that returns to the atmosphere.







## Phosphorus Cycle:

Phosphorus compounds are found in rocks and soil.

The plant absorbs phosphorus compounds after they are released from rocks as a result of weathering processes, and then moves to animals through the food chain to form bones, teeth, nucleic acids (DNA and RNA), and energy molecules (ATP).

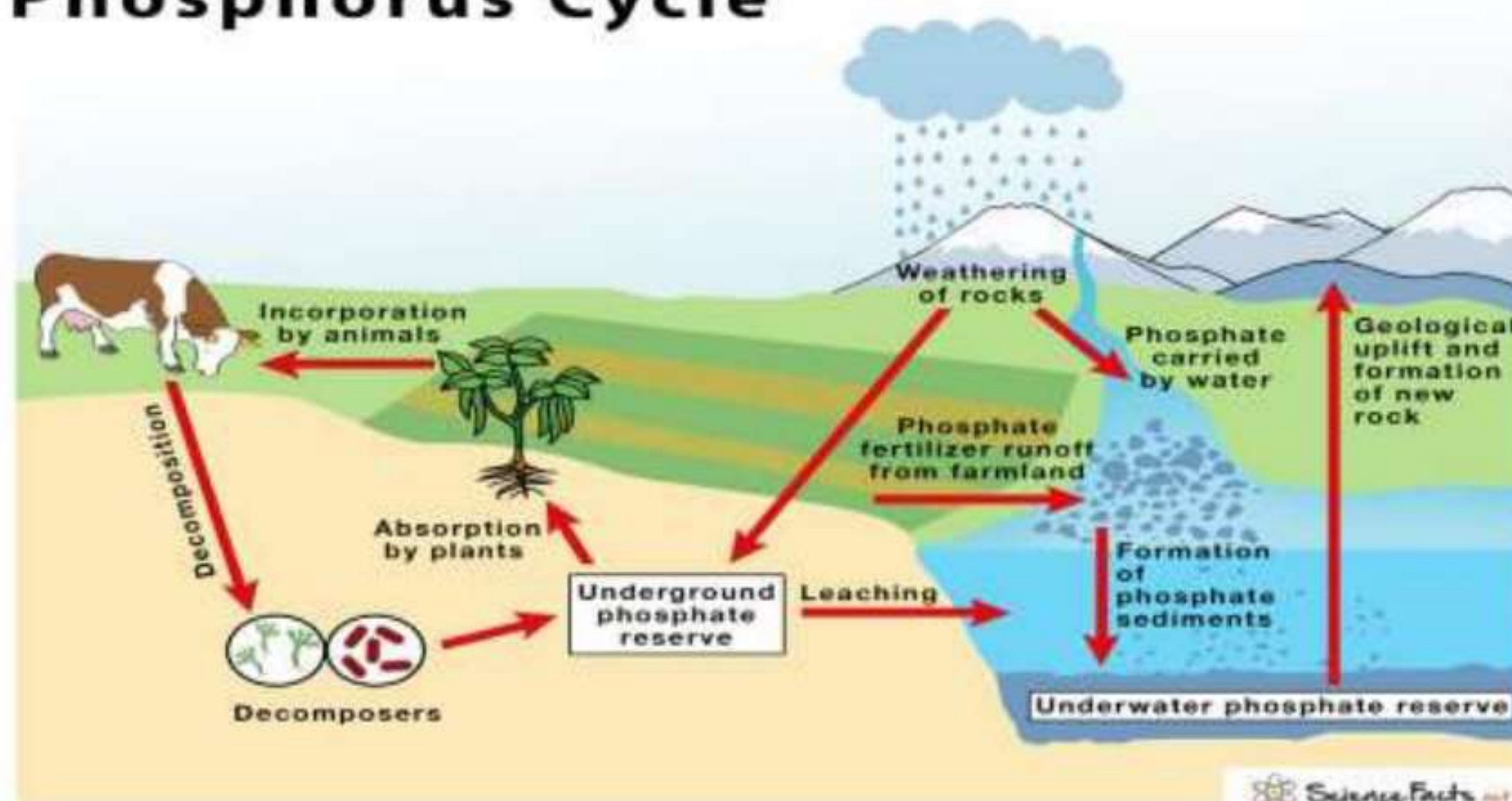
When living organisms die or through their waste, decomposers return phosphorus to the soil again.

Unlike the carbon and nitrogen cycles, the atmosphere is not part of the phosphorus cycle, but the phosphorus cycle remains confined between the biosphere, lithosphere, and hydrosphere.

يبقى محصوراً بين

Element cycles are essential for the continuation of life on Earth, as they ensure the recycling of vital elements between living organisms and the environment in a balanced manner.

## Phosphorus Cycle



The excretion process is not limited to getting rid of wastes from inside living organisms,

But represents an important link in the continuation of element cycles in nature.

The materials resulting from excretion, such as carbon dioxide and urea, return to participate in the cycles of carbon, nitrogen, and others; where urea decomposes in the soil by bacteria into ammonia and then nitrates, which are absorbed by plants, ensuring the reuse of elements and the continuation of life in the biosphere. Excretion processes and natural cycles together contribute to maintaining balance and stability in the biosphere, keeping it suitable for supporting different forms of life.







### Chapter three (3) Lesson (3)

#### Choose the correct answer

1-Which of the following organs is the main one responsible for removing nitrogenous wastes from the blood?

- a) Liver      b) Skin      c) Kidneys      d) Lungs

2-When salts increase in the blood, the kidneys respond by:

- a) Secreting more sweat      b) Increasing water reabsorption  
c) Increasing water excretion      d) Storing salts

3-Toxic ammonia in the body is converted to urea in the:

- a) Kidneys      b) Liver      c) Lungs      d) Skin

4-What illustrates the relationship between excretion and internal balance in the body?

- a) Excreting water only      b) Maintaining the stability of the body's internal environment  
c) Producing energy      d) Transporting oxygen

5-If the kidneys fail to perform their functions, the first thing affected is:

- a) Oxygen level      b) Percentage of wastes in the blood  
c) Number of blood cells      d) Hormone production

6-The amount of sweat secreted by the body increases when:

- a) Temperature decreases      b) Humidity increases  
c) Temperature rises      d) Blood flow to the skin decreases

7-What component is reabsorbed in the kidneys to maintain water balance?

- a) Glucose      b) Carbon dioxide      c) Water      d) Ammonia

8-Excretion of carbon dioxide from the lungs is an example of:

- a) Temperature regulation      b) Gaseous excretion  
c) Solid excretion      d) Neural transport

9-What is the common role of the skin and kidneys in homeostasis?

- A) Hormone production      B) Waste storage  
C) Water and salt excretion      D) Energy production

10. Body toxicity increases when

- (A) the respiratory rate decreases      B) metabolic waste accumulates  
C) sweating increases      D) blood pressure decreases

#### II. Essay Questions

Explain: Explain why:

- 1-Ammonia in the body is converted to urea before excretion?
- 2-Excreting a large amount of sweat in hot weather helps keep the body balanced?
- 3-A disturbance in body functions occurs when metabolic wastes accumulate?
- 4-The amount of urine increases when drinking large amounts of water?
- 5-Excretion is essential for maintaining the homeostasis of a living organism?





حمل الآن

مجاناً وحصرياً

# المراجعة رقم (3)

## اختبار شهر مارس





## الدرس - الأول -

**First : Choose the correct answer :**

1. **It is where living organisms are found on, above and below the Earth's surface?.....**
  - a. ☐ Lithosphere
  - b. ☐ Biosphere
  - c. ☐ Atmosphere
  - d. ☐ Hydrosphere
2. **It refers to all forms of water on Earth. It includes surface water bodies like rivers, oceans, lakes, and ponds, groundwater, water vapor (clouds and fog) in the atmosphere, and ice?...**
  - a. ☐ Lithosphere
  - b. ☐ Biosphere
  - c. ☐ Atmosphere
  - d. ☐ Hydrosphere
3. **It is a blanket of gases that surrounds Earth. It is held near the surface of the planet by Earth's gravitational attraction?.....**
  - a. ☐ Lithosphere
  - b. ☐ Biosphere
  - c. ☐ Atmosphere
  - d. ☐ Hydrosphere
4. **It is a rigid, rocky outer layer of Earth, consists of the crust and the solid outermost layer of the upper mantle?.**
  - a. ☐ Lithosphere
  - b. ☐ Biosphere
  - c. ☐ Atmosphere
  - d. ☐ Hydrosphere
5. **The environment includes biotic factors such as humans, animals, and plants, and abiotic factors such as air and water. The previous paragraph contains the types of spheres found on the Earth, except for...**
  - a. ☐ biosphere
  - b. ☐ lithosphere
  - c. ☐ hydrosphere
  - d. ☐ Atmosphere
6. **The biosphere is considered an "integrated system" because.....**
  - a. ☐ Every organism in it lives in isolation from the others
  - b. ☐ It is the largest sphere in terms of geological size
  - c. ☐ The survival of organisms depends on complex interactions
  - d. ☐ It contains only rocks



24. Which of the following organisms can perform photosynthesis?....

- a. ☐ Fungi
- b. ☐ Primary consumers
- c. ☐ Herbivores
- d. ☐ Some specialized bacteria

25. What process do plants use to convert light energy into chemical energy?.....

- a. ☐ Cellular respiration
- b. ☐ Photosynthesis
- c. ☐ Decomposition
- d. ☐ Fermentation

26. Which compound is the source of carbon in photosynthesis?.....

- a. ☐ Glucose
- b. ☐ Carbon dioxide
- c. ☐ Adenosine triphosphate (ATP)
- d. ☐ Water

27. What is the main result of photosynthesis?.....

- a. ☐ Converting light energy into chemical energy stored in glucose
- b. ☐ Producing adenosine triphosphate (ATP)
- c. ☐ Producing carbon dioxide
- d. ☐ Producing water

28. Which compound is used as a byproduct (secondary product) of photosynthesis?.....

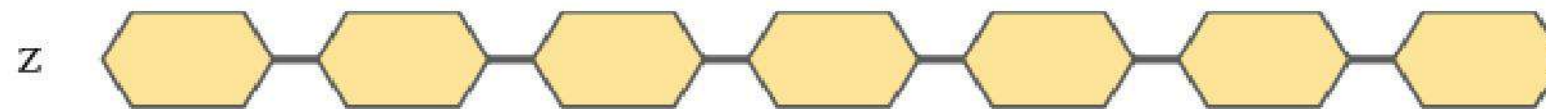
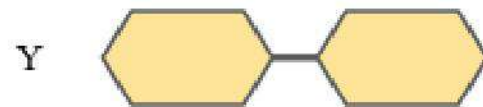
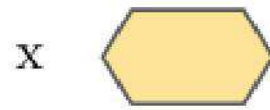
- a. ☐ Adenosine triphosphate (ATP)
- b. ☐ Oxygen
- c. ☐ Glucose
- d. ☐ Water

29. Which of the following organisms represents the "link" that returns matter from the final consumer back to the producer?.....

- a. ☐ Algae
- b. ☐ Fungi
- c. ☐ Hawk
- d. ☐ Rabbit



52. Which of the diagrams provided most accurately represents the structure of a monosaccharide?.....



a. ☐ X

b. ☐ Z

c. ☐ Y

d. ☐ None

53. The relationship between the number of glucose molecules in disaccharide and polysaccharide and their solubility in water is.....relationship

a. ☐ direct

b. ☐ constant

c. ☐ inverse

d. ☐ not exists

54. The structural carbohydrate is.....

a. ☐ starch

b. ☐ glycogen

c. ☐ (a) and (b)

d. ☐ cellulose

55. Chitin in insects and Cellulose in plants are similar in the function of.....

a. Both are rapid sources of energy

b. Both are stored in the liver

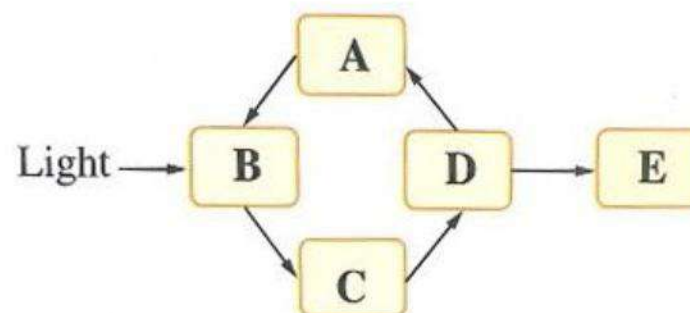
c. Both dissolve in water

d. Both are involved in forming support structures



65. The opposite diagrammatic figure illustrates a biological cycle that takes place between the plant and the atmospheric air, if you know that letter (A) represents ( $\text{CO}_2 + \text{H}_2\text{O}$ ).

What do these letters (B, C, D & E) represent?.....



|                            | (B)          | (C)                    | (D)          | (E)                    |
|----------------------------|--------------|------------------------|--------------|------------------------|
| a. <input type="radio"/> O | Chloroplast  | ATP                    | Mitochondria | Glucose + $\text{O}_2$ |
| b. <input type="radio"/> O | Chloroplast  | Glucose + $\text{O}_2$ | Mitochondria | ATP                    |
| c. <input type="radio"/> O | Mitochondria | Glucose + $\text{O}_2$ | Chloroplast  | ATP                    |
| d. <input type="radio"/> O | Mitochondria | ATP                    | Chloroplast  | Glucose + $\text{O}_2$ |

66. Why does the cell not use glucose energy directly without an intermediate compound (ATP)?.....

- a. Because glucose is a complex sugar
- b. Because glucose does not contain energy
- c. Because ATP molecules have a simple structure
- d. Because ATP represents a continuous and renewable energy

67. Which of the following vital processes keep(s) the balance of gases in the atmosphere?.....

- a. ☐ O Photosynthesis only
- b. ☐ O Photosynthesis and cellular respiration
- c. ☐ O Cellular respiration only
- d. ☐ O Excretion and cellular respiration

68. The normal sequence of energy production inside the corn plant cells is.....

- a. ☐ O ATP – glucose – starch – glucose
- b. ☐ O Starch – ATP – glucose – ATP
- c. ☐ O Glucose – starch – glucose – ATP
- d. ☐ O Glucose – starch – ATP



82. Which of the following foods would you expect to give the highest  $\Delta T$  value when one gram of it is burned in a calorimeter?.....

- a. ☐ A piece of bread
- b. ☐ A drop of olive oil
- c. ☐ A piece of muscle fiber meat
- d. ☐ A piece of cucumber

83. Which of the following alternatives represents the correct order for the speed of obtaining energy?.....

- a. ☐ Starch  $\rightarrow$  Fats  $\rightarrow$  Glucose
- b. ☐ Glucose  $\rightarrow$  Sucrose  $\rightarrow$  Starch
- c. ☐ Cellulose  $\rightarrow$  Glucose  $\rightarrow$  Fats
- d. ☐ Glycogen  $\rightarrow$  Protein  $\rightarrow$  Sucrose

84. Advances in electron microscopy technology have helped in.....

- a. ☐ converting sugar into fats
- b. ☐ increasing body weight
- c. ☐ understanding how molecules are arranged inside the cell
- d. ☐ cooling the cell

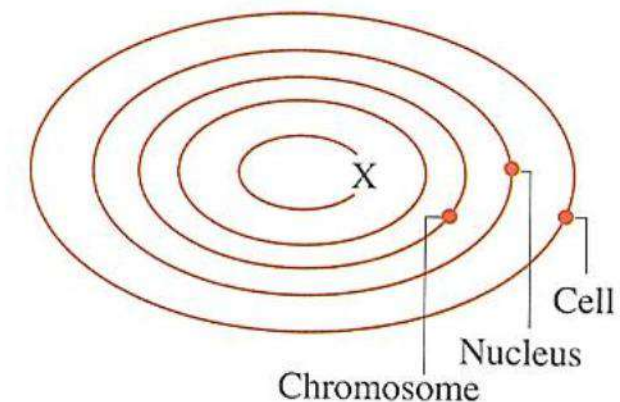
85. A practical application resulting from using the electron microscope to study the cell membranes is...

- a. ☐ designing drugs that target specific proteins inside the cell
- b. ☐ improving the ability of organisms to produce energy
- c. ☐ increasing the rate of cell division
- d. ☐ reducing the need for lipids in membranes

86. From the opposite diagrammatic figure :

What does the part (X) represent?...

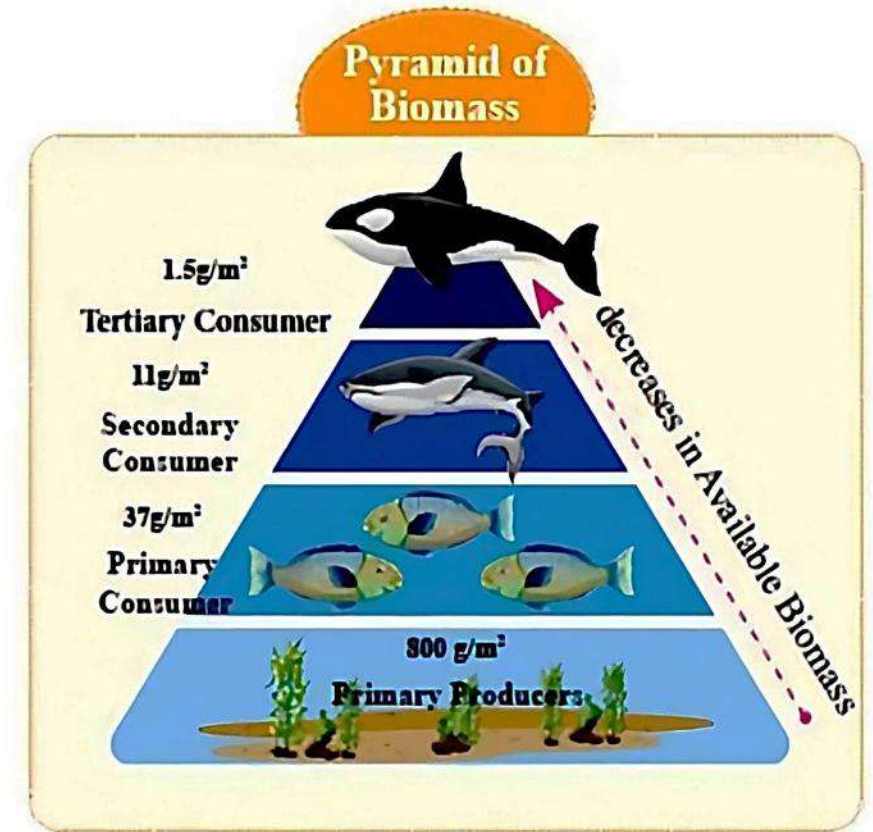
- a. ☐ Nucleolus
- b. ☐ RNA
- c. ☐ Nucleotide
- d. ☐ DNA





7. In the opposite figure :

1. What is the ratio of the mass available to primary consumers consider to producers?.....
  - a. ☐ 0.187%
  - b. ☐ 1.37%
  - c. ☐ 4.62%
  - d. ☐ 10%
2. What is the ratio of the mass available to secondary consumers consider to producers?.....
  - a. ☐ 0.187%
  - b. ☐ 1.37%
  - c. ☐ 4.62%
  - d. ☐ 10%
3. What is the ratio of the mass available to tertiary consumers consider to producers?.....
  - a. ☐ 0.187%
  - b. ☐ 1.37%
  - c. ☐ 4.62%
  - d. ☐ 10%



### Third : Essay questions :

1. How do you explain that a "biosphere" is a higher organizational level than an ecosystem

.....

.....

.....

2. Clarify the importance of "chlorophyll" in the continuity of the biosphere?

.....

.....

.....



## الدرس - الثاني -

**First : Choose the correct answer :**

1. **Which of the following processes is responsible for converting potential energy in food into active energy?...**
  - a. ☐ Transport
  - b. ☐ Excretion
  - c. ☐ Respiration
  - d. ☐ Photosynthesis
2. **The primary function of xylem tissue in plants is to transport.....**
  - a. ☐ products of photosynthesis
  - b. ☐ water and minerals
  - c. ☐ oxygen
  - d. ☐ energy
3. **The presence of lignin in the walls of xylem vessels helps to.....**
  - a. ☐ store organic materials
  - b. ☐ give the cells flexibility and softness
  - c. ☐ resist the tension pressure during ascent of water
  - d. ☐ regulate stomata opening
4. **The Cohesion-Adhesion theory depends primarily on the properties of ...**
  - a. ☐ water molecules
  - b. ☐ oxygen
  - c. ☐ food molecules
  - d. ☐ carbon dioxide
5. **Movement of water in xylem vessels relies primally on physical forces, the most important of which are...**
  - a. ☐ Cohesion and adhesion only
  - b. ☐ Cohesion and adhesion and the tensile force resulting from transpiration
  - c. ☐ Active transport of energy
  - d. ☐ The tensile force resulting from transpiration only
6. **If the leaves of a pine tree are coated with a waxy substance that blocks the stomata, the first process to stop will be.....**
  - a. ☐ lignin production
  - b. ☐ water flow in the phloem
  - c. ☐ upward movement of water to the leaves
  - d. ☐ food storage



7. **During summer, why does the process of transpiration become more important for the plant?.....**

- a. ☐ Because it helps cool the leaves
- b. ☐ Because it increases sugar storage
- c. ☐ Because it reduces salt absorption
- d. ☐ Because it stops photosynthesis

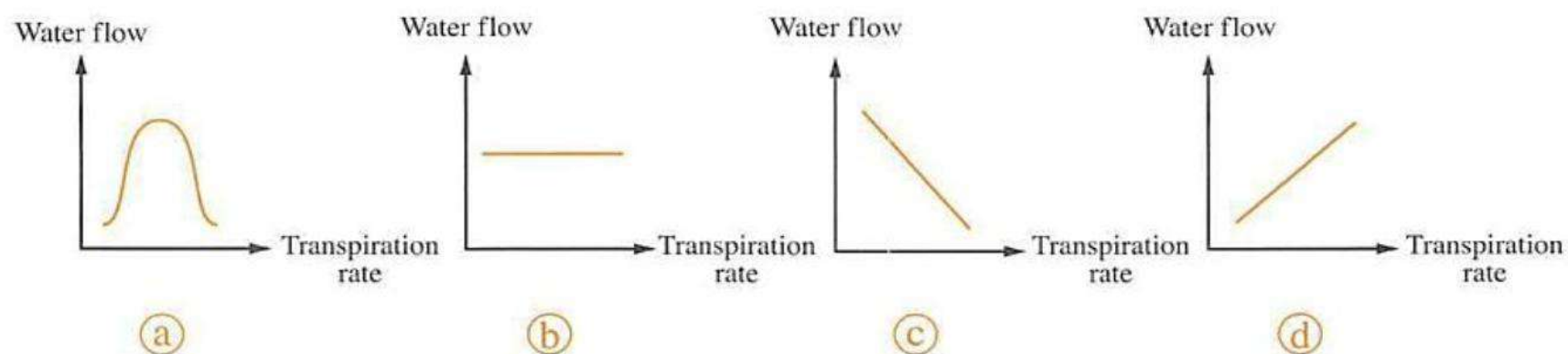
8. **The appearance of air bubbles inside xylem vessels causes.....**

- a. ☐ increased transpiration rate
- b. ☐ increased speed of water ascent
- c. ☐ salt accumulation in leaves
- d. ☐ obstruction of the water column movement upwards

9. **When air bubbles entered in the xylem vessels, the plant loses.....force**

- a. ☐ adhesion
- b. ☐ pulling
- c. ☐ cohesion
- d. ☐ root pressure

10. **Which of the following graphs illustrates the relation between the transpiration rate and the water flow in the stem during the first day hours?.....**



11. **Through which of the following the product of the photosynthesis process transfers in the plant?.....**

- a. ☐ Tracheids
- b. ☐ Vessels
- c. ☐ Parenchyma cells
- d. ☐ Sieve tubes



12. How far these statements are correct?.....

- Phloem tissue contains sieve tubes and companion cells
- The sieve tubes provide the companion cells with the energy needed to transfer the products of the photosynthesis from the leaves to all the plant parts"

- The two statements are correct
- The two statements are wrong
- The first statement is correct and the second statement is wrong
- The first statement is wrong and the second statement is correct

13. What is the similarity between xylem and phloem?.....

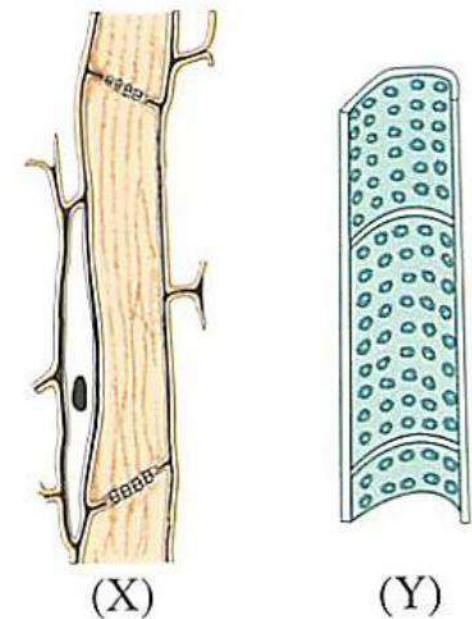
- ☐ The direction of the substance's movement inside them
- ☐ The structure
- ☐ The type of thickening
- ☐ The type of tissue

14. In which the structure (X) is similar to the structure (Y)?.....

- ☐ The transfer of food substances that are formed in leaves
- ☐ The transfer of water and salts in one direction only
- ☐ Both are thickened by lignin
- ☐ Both are vascular tissues

15. Damage to the phloem in a tree leads to.....

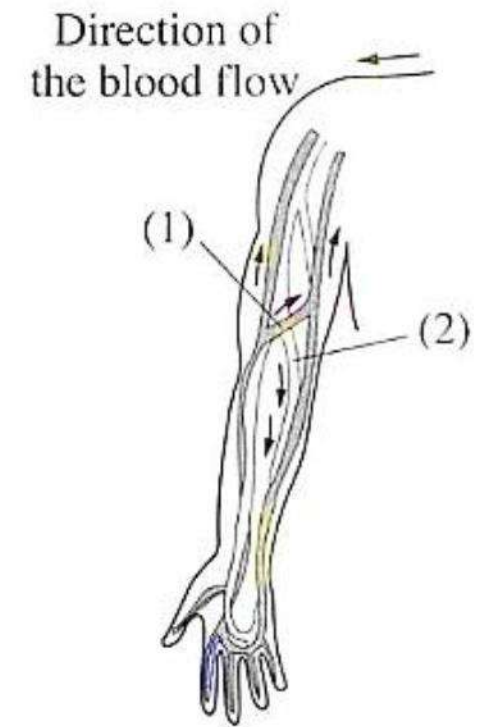
- ☐ roots drying out due to lack of water
- ☐ death of roots due to lack of food supply
- ☐ increased salt absorption
- ☐ stopping of transpiration





26. In the opposite figure :

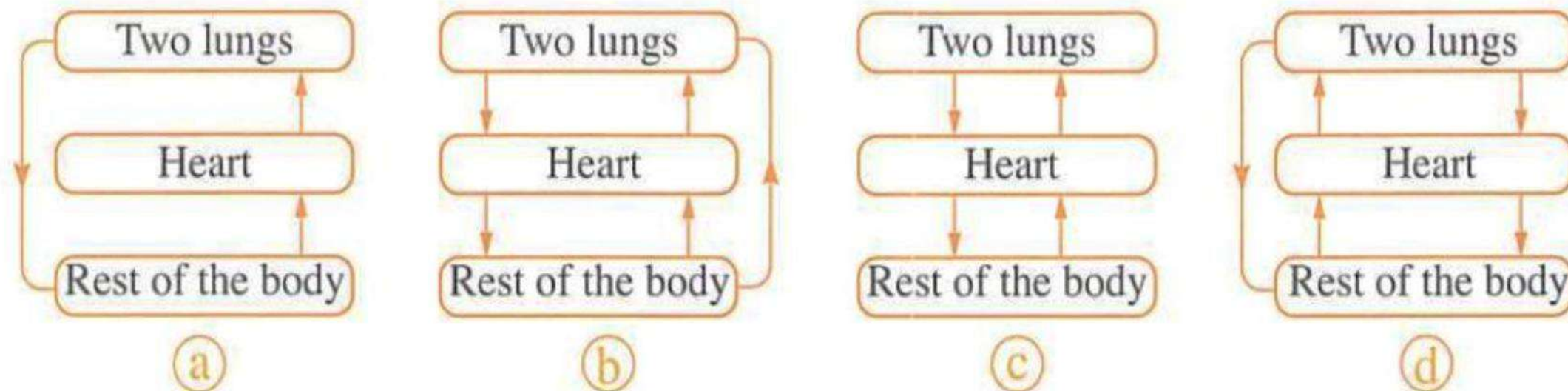
1. Which of the following statements doesn't agree with structure no. (1)?.....
  - a. ☐ Its wall contains valves
  - b. ☐ It carries blood to the heart
  - c. ☐ It is not a pulsating blood vessel
  - d. ☐ It carries oxygenated blood
2. Which of the following doesn't agree with the characteristics of structure no. (2)?..
  - a. ☐ It carries oxygenated blood
  - b. ☐ It carries deoxygenated blood
  - c. ☐ It carries blood away from the heart
  - d. ☐ The blood pressure in it is bigger than no. (1)



27. The pulmonary circulation begins with.....

- a. ☐ oxygenated blood from the left ventricle
- b. ☐ deoxygenated blood from the right ventricle
- c. ☐ deoxygenated blood from the left ventricle
- d. ☐ oxygenated blood from the right ventricle

28. Which of the following diagrams illustrates the blood circulation in the human body?.....

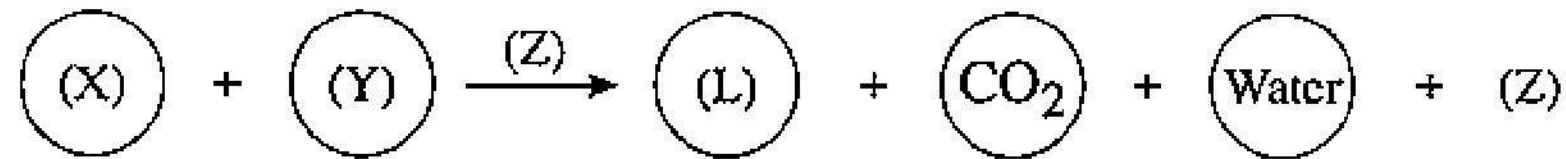




48. The structure of ATP molecule is different from the structure of ADP molecule in the.....

- a. O type of sugar
- b. O type of nitrogenous base
- c. O number of phosphate groups
- d. O number of carbon atoms

49. The following equation illustrates a vital process occurs in each of the plant and animal



Which of the following represents the symbols of the equation?..

|      | (X)            | (Y)            | (Z)            | (L)     |
|------|----------------|----------------|----------------|---------|
| a. O | O <sub>2</sub> | ATP            | Enzymes        | Glucose |
| b. O | Glucose        | O <sub>2</sub> | Enzymes        | ATP     |
| c. O | Enzymes        | O <sub>2</sub> | ATP            | Glucose |
| d. O | Glucose        | Enzymes        | O <sub>2</sub> | ATP     |

50. Anaerobic respiration in human muscles during strenuous exercise results in the accumulation of.....

- a. O ethyl alcohol
- b. O glycogen
- c. O glucose
- d. O lactic acid

51. The accumulation of lactic acid in muscles leads to.....

- a. O products of photosynthesis
- b. O feeling of muscle fatigue (tired)
- c. O decreases in water and minerals
- d. O increased muscle activity



117. In the thermal decomposition reaction of calcium carbonate into calcium oxide and carbon dioxide ...

- a. O heat is transferred from the surrounding medium to the system  $\Delta H +$
- b. O heat is transferred from the system to the surrounding medium  $\Delta H -$
- c. O heat is transferred from the system to the surroundings  $\Delta H +$
- d. O heat is transferred from the surroundings to the system  $\Delta H -$

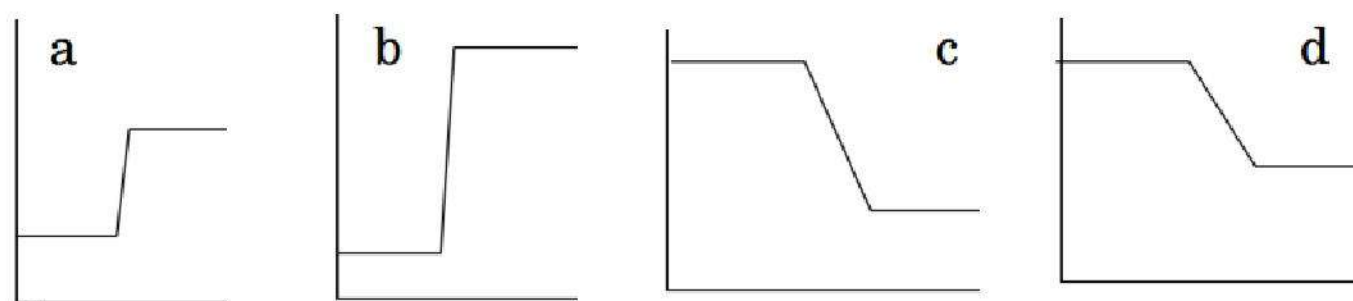
118. When dissolving ammonium chloride in water, the temperature of the solution decreased, so the process is...

- a. O endothermic, with a positive  $\Delta H$  value
- b. O exothermic, with a negative  $\Delta H$  value
- c. O endothermic, with a negative  $\Delta H$  value
- d. O exothermic, with a positive  $\Delta H$  value

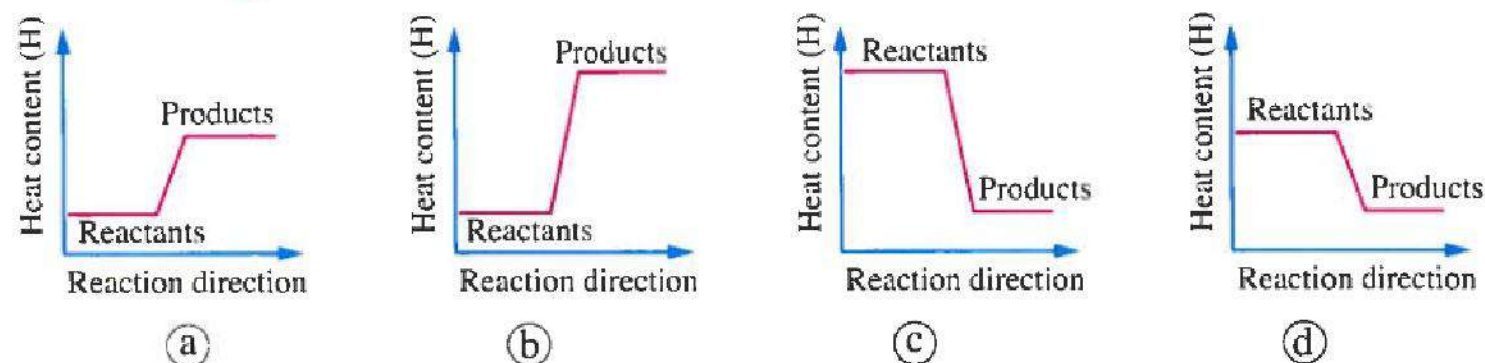
119. When sodium chloride is dissolved in water, the temperature of the solution decreases, so the process is...

- a. O endothermic reaction  $+\Delta H$
- b. O exothermic reaction  $+\Delta H$
- c. O exothermic reaction  $-\Delta H$
- d. O endothermic reaction  $-\Delta H$

120. Which graph represented a reaction produces largest amount of energy (heat) to surrounding medium?.....

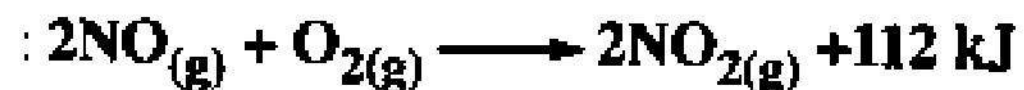


121. Which of the following graphs represents a chemical reaction in which the reactants absorb the least amount of heat energy from surrounding?.....





125. In the two following reactions,  $\Delta H$  has.....

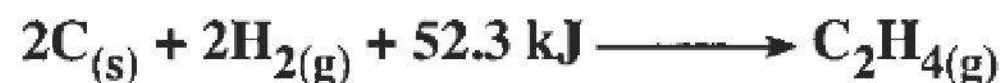


- a. ☐ a (-ve) sign, because the reaction is endothermic
- b. ☐ a (+ve) sign, because the reaction is endothermic



- c. ☐ a (-ve) sign, because the reaction is exothermic
- d. ☐ a (+ve) sign, because the reaction is exothermic

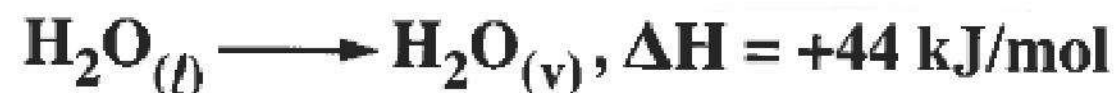
126. From the following equation :



We conclude that.....

- a. ☐ the surrounding gains heat
- b. ☐ heat is transferred from the surrounding to the system
- c. ☐ the system is thermally isolated
- d. ☐ heat is transferred from the system to the surrounding

127. From the following equation :



- a. ☐ heat content of water vapour > heat content of liquid water
- b. ☐ heat content of water vapour = half heat content of liquid water
- c. ☐ heat content of water vapour < heat content of liquid water
- d. ☐ heat content of water vapour = heat content of liquid water

128. Which of the following equations represents an exothermic reaction?.....

- a. ☐  $\text{XY}_5 \rightarrow \text{XY}_3 + \text{Y}_2, \Delta H = +420 \text{ KJ}$
- b. ☐  $\text{XY}_5 \rightarrow \text{XY}_3 + \text{Y}_2 + 420 \text{ KJ}$

- c. ☐  $\text{XY}_5 \rightarrow \text{XY}_3 + \text{Y}_2 - 420 \text{ KJ}$
- d. ☐  $\text{XY}_5 + 420 \text{ KJ} \rightarrow \text{XY}_3 + \text{Y}_2$



## Second : Problems :

1. The number of moles in 180 g of acetic acid ( $\text{CH}_3\text{COOH}$ ) =...

(C = 12, H = 1, O = 16)

a. O 1 mol

b. O 2 mol

c. O 3 mol

d. O 4 mol

.....  
.....  
.....

2. Using the chemical equation :



Then heat change ( $\Delta H$ ) for condensation of 2 mole of water =..... K.J

a. O - 88 K.J

b. O + 88 K.J

c. O - 44 K.J

d. O + 44 K.J

.....  
.....  
.....

3. In the reaction :



What is the change in heat of the decomposition of 0.34 g of hydrogen peroxide ( $\text{H}_2\text{O}_2$ )

(H = 1, O = 16)

a. O - 0.98 kJ

b. O - 1.96 kJ

c. O - 196 kJ

d. O - 98 KJ

.....  
.....  
.....



6. From the combustion equation of the hydrocarbon



If 84 grams of the hydrocarbon are completely burned, then.....

- a. ☐ The surrounding medium gains 955 KJ of energy  
b. ☐ The surrounding medium loses 2865 KJ of energy  
c. ☐ The reactants lost 2865 KJ of energy  
d. ☐ The surrounding medium gains 1910 KJ of energy

.....

.....

.....

.....

7. If you know the following reaction, take place under hard condition



Calculate the amount of heat lost from 252 g of water to freeze

.....

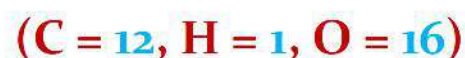
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8. From the following reaction :



If an amount of energy equal to 4359 kJ is released, calculate the mass of methanol burned?



.....

.....

.....



7. Compare between exothermic reactions -endothermic reaction in term of :

a. Sign of  $\Delta H$

b.  $H_r - H_p$

.....

.....

.....

8. Study the opposite figure then answers :

Which reaction (1 or 2) absorbs more energy to occur?

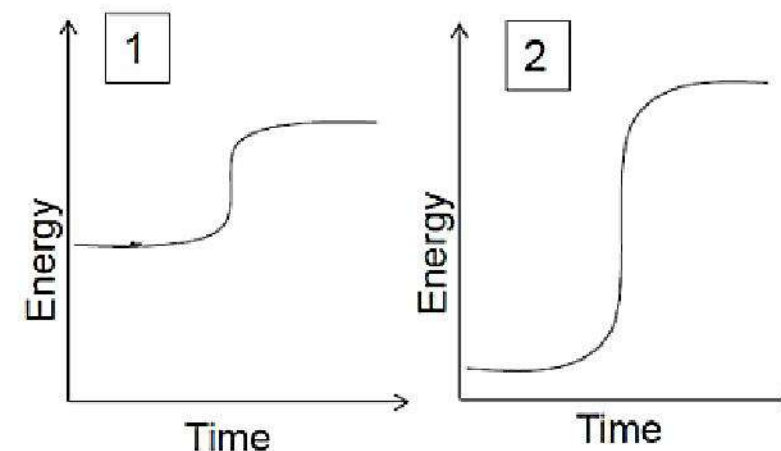
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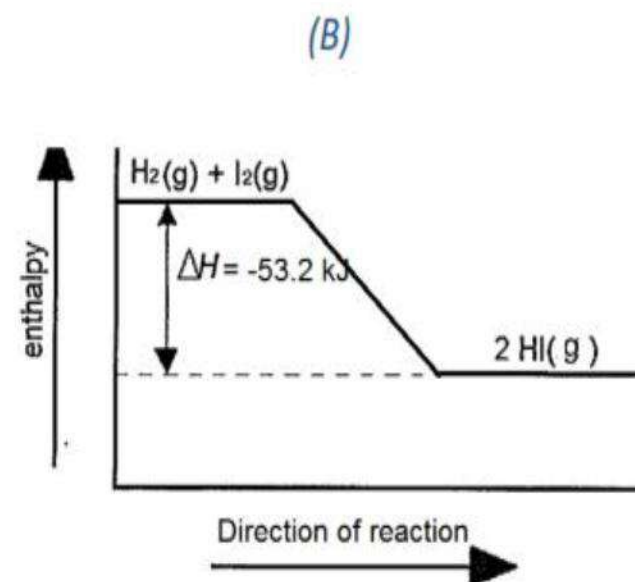
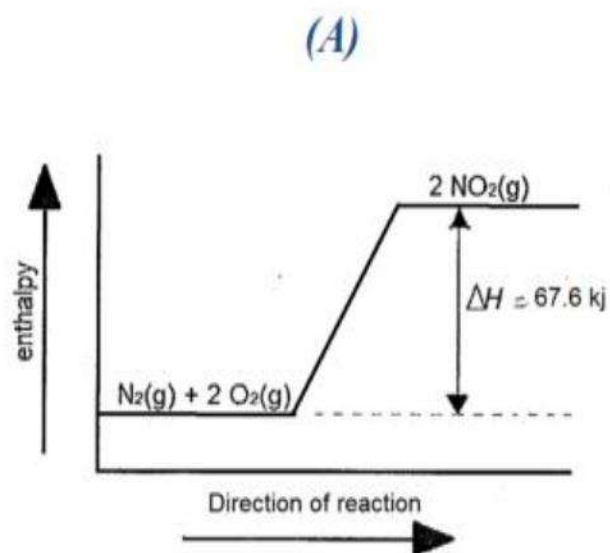
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9. Study the following figures then answer :



a. Which reaction required energy to occur? (....)

b. Which reaction will increase the temperature of the surrounding medium? (....)



## الدرس - الثالث -

**First : Choose the correct answer :**

1. **Which of the following best defines metabolism?.....**
  - a. ☐ Metabolism is the sum of all the energy lost from an organism
  - b. ☐ Metabolism is how quickly the body digests a meal
  - c. ☐ Metabolism is the sum of the chemical reactions occur in each cell of an organism
  - d. ☐ Metabolism is how quickly a person can lose weight
2. **Metabolism is a process of .....**
  - a. ☐ catabolism only
  - b. ☐ anabolism only
  - c. ☐ both catabolism and anabolism
  - d. ☐ excretion only
3. **What is the importance of catabolic processes inside the human body?.....**
  - a. ☐ They involve the synthesis of a complex molecule
  - b. ☐ They involve providing the energy required for performing the vital activities of a cell
  - c. ☐ They involve storing glucose molecules as glycogen in the liver cells
  - d. ☐ They involve forming new bonds between inorganic molecules to produce organic molecules
4. **Which of the following does not describe the anabolic process?.....**
  - a. ☐ It is a process of releasing energy stored in the chemical bonds present in the molecules
  - b. ☐ It is a process that occurs in both human and plant cells
  - c. ☐ It is the set of pathways that construct and build molecules from smaller units
  - d. ☐ All of the answers correctly describe the anabolic process



5. Which of the following illustrates the dual nature of metabolism?.....

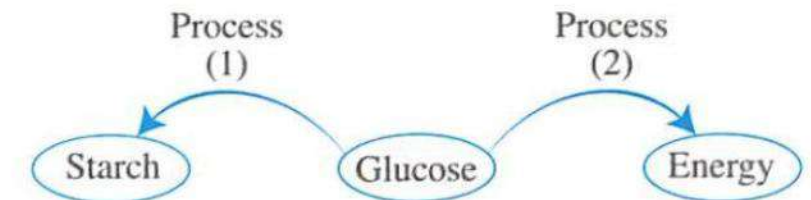
- a. ☐ Muscle contraction and relaxation
- b. ☐ Nerve impulse transmission

- c. ☐ Protein synthesis and glucose breakdown
- d. ☐ Inhalation and exhalation

6. The following diagram expresses processes that occur in a plant cell.

What do these processes represent?.....

- a. ☐ The process no. (1) is catabolism, and the process no.(2) is anabolism
- b. ☐ Both of processes no. (1) and (2) are catabolism
- c. ☐ The process no. (2) is catabolism, and the process no.(1) is anabolism
- d. ☐ Both of processes no. (1) and (2) are anabolism



7. The relationship between "catabolism" and metabolic waste products is.....

- a. ☐ direct; increased catabolism increases waste products
- b. ☐ inverse; catabolism reduces waste products
- c. ☐ constant; unaffected by activity
- d. ☐ metabolic waste products are limited to the products of anabolism only

8. From the wastes that are produced from the degradation of carbohydrates after their digestion are.....

- a. ☐  $O_2$  and  $CO_2$
- b. ☐ water and  $O_2$
- c. ☐ water and  $CO_2$
- d. ☐ nitrogen and  $CO_2$

9. Ammonia is a waste product resulting from the breakdown of.....

- a. ☐ starch
- b. ☐ fats
- c. ☐ amino acids
- d. ☐ glucose

10. All the following are from the excretory products, excepts.....

- a. ☐  $CO_2$
- b. ☐ nitrogen
- c. ☐ water
- d. ☐ urea

11. Which of the following are waste products excreted by the human body?.....

- a. ☐ Urea and glucose
- b. ☐ Carbon dioxide and hemoglobin
- c. ☐ Carbon dioxide and urea
- d. ☐ Urea only



18. **An increase in the concentration of sodium ions in the blood directly affects...**

- a. ☐ Rate of breathing
- b. ☐ Production of skin pigment
- c. ☐ Kidneys activity
- d. ☐ Breakdown of hemoglobin

19. **When there is a disturbance in ion concentration inside a body, delicate vital processes such as.....are affected**

- a. ☐ hair growth
- b. ☐ skin color
- c. ☐ nerve and muscle function
- d. ☐ liver size

20. **When the salts in the blood increase, the kidneys respond by.....**

- a. ☐ secreting more Sweat
- b. ☐ increasing the reabsorption of water
- c. ☐ increasing the excretion of water
- d. ☐ storing salts

21. **What is the main function of reabsorption in the kidneys?.....**

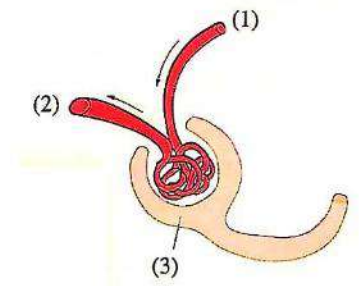
- a. ☐ Removing wastes from the blood
- b. ☐ Recovering useful substances such as glucose
- c. ☐ Storing urine
- d. ☐ Converting ammonia into urea

22. **What component is reabsorbed in the kidneys to maintain water balance?.....**

- a. ☐ Glucose
- b. ☐ Carbon dioxide
- c. ☐ Water
- d. ☐ Ammonia

23. **In the opposite figure, which of the following statements is correct?.....**

- a. ☐ The concentration of glucose in no. (1) is higher than that in no. (2)
- b. ☐ The concentration of glucose in no. (2) is higher than that in no. (1)
- c. ☐ The concentration of glucose is equal in both of no. (2) and (3)
- d. ☐ The concentration of glucose in no. (3) is equal to the summation of its concentration in both of no. (1) and (2)



24. **When examining a urine sample from a patient, it was found to contain large amounts of glucose.**

**This may indicate a defect in the process of.....**

- a. ☐ filtration
- b. ☐ reabsorption
- c. ☐ storage of urine
- d. ☐ excretion



49. **The breakdown of hemoglobin resulting from the destruction of old red blood cells produces the substance..**

a. ☐ ammonia

b. ☐ uric acid

c. ☐ urea

d. ☐ bilirubin

50. **The accumulation of bilirubin in the body leads to .....**

a. ☐ jaundice

b. ☐ bile

c. ☐ asthma

d. ☐ dehydration

51. **Bile juice helps in the disposal of .....**

a. ☐ glucose

b. ☐ blood vessels

c. ☐ excess cholesterol

d. ☐ oxygen

52. **Which excretory organ would be most affected when consuming foods containing dyes?.....**

a. ☐ Lungs

b. ☐ Bladder

c. ☐ Liver

d. ☐ Skin

53. **Which of the following organs is considered the primary organ responsible for removing the nitrogenous waste from the blood?...**

a. ☐ The liver

b. ☐ The skin

c. ☐ The kidneys

d. ☐ The lungs

54. **The relationship between the liver and kidney in dealing with proteins is.....**

a. ☐ the kidney breaks down proteins and the liver expels them

b. ☐ the liver converts ammonia into urea and the kidney excretes it

c. ☐ both absorb proteins

d. ☐ no relationship

55. **Which of the following foodstuff is not recommended for a kidney failure patient to eat too much?.....**

a. ☐ Red meat

b. ☐ Brown bread

c. ☐ Olive oil

d. ☐ Vegetables

56. **Which of the following illustrates the correct pathway to get rid of urea substance from the body?.....**

a. ☐ Liver → Kidney → Urethra → Urinary bladder

b. ☐ Liver → Urethra → Kidney → Ureter

c. ☐ Liver → Kidney → Ureter → urethra

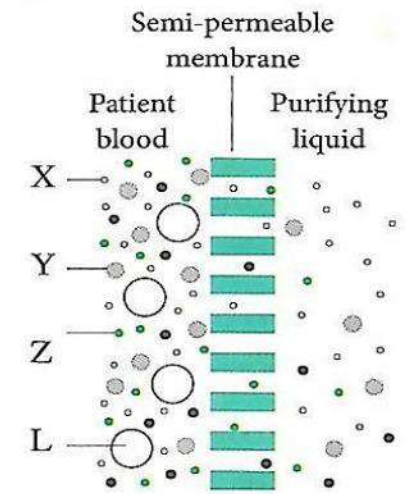
d. ☐ Liver → ureter → kidney → urinary bladder



71. **The opposite figure represents blood purification process by the artificial kidney device.**

**Which of the following represents a red blood cell? .....**

- a. ☐ X
- b. ☐ Y
- c. ☐ Z
- d. ☐ L



72. **The process of sweating is considered an application of the concept of.....**

- a. ☐ internal balance only
- b. ☐ filtration
- c. ☐ thermal equilibrium only
- d. ☐ thermal equilibrium and evaporation

73. **Using Infrared Thermography to measure skin temperature is a measurement of .....**

- a. ☐ nuclear energy
- b. ☐ soil nitrates
- c. ☐ energy lost in the process of thermal balance
- d. ☐ sound waves

74. **The diagnosis that does not require surgery thanks to Ultrasound is .....**

- a. ☐ kidney transplantation
- b. ☐ cell engineering
- c. ☐ heart valve replacement
- d. ☐ detection of stones and inflammations

75. **Ultrasound devices used for imaging organs rely on sound properties such as .....**

- a. ☐ evaporation and transpiration
- b. ☐ fixation and denitrification
- c. ☐ weathering and deposition
- d. ☐ reflection and refraction

76. **The boundaries in Ultrasound mean the transition from.....**

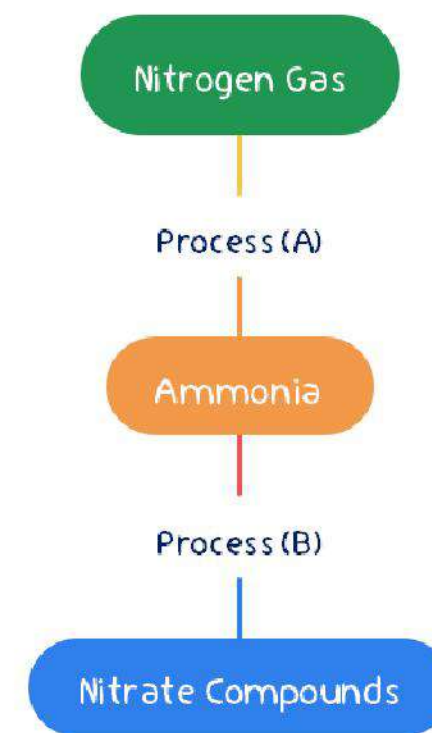
- a. ☐ liquid to gas only
- b. ☐ bacteria to nitrates
- c. ☐ one medium with acoustic impedance to another medium
- d. ☐ carbon to phosphorus



100. Study the following diagram :

What is the name of the organism that performs the processes (A and B)?.....

|      | Organism (A)             | Organism (B)             |
|------|--------------------------|--------------------------|
| a. O | Lysogenic bacteria       | Nitrogen-fixing bacteria |
| b. O | Nitrogen-fixing bacteria | Lysogenic bacteria       |
| c. O | Nitrifying bacteria      | Nitrogen-fixing bacteria |
| d. O | Nitrogen-fixing bacteria | Nitrifying bacteria      |



101. The process of converting nitrate into nitrogen is called.....

- a. O decomposition
- b. O nitrogen fixation
- c. O nitrification
- d. O denitrification

102. What are the main chemical reactions in the carbon and nitrogen cycles?.....

- a. O Cellular respiration, photosynthesis, and nitrification
- b. O Photolysis, nuclear fusion, and mineralization
- c. O photosynthesis, biodegradation, and filtration
- d. O cellular respiration, nuclear fusion, and precipitation

103. Which of the following reflects a disruption in the nitrogen cycle due to human activity?.....

- a. O planting diverse crops
- b. O crop rotation
- c. O excessive use of chemical fertilizers
- d. O presence of nitrifying bacteria in soil

104. Phosphorus compounds are found in.....

- a. O atmosphere and soil
- b. O rocks and soil
- c. O atmosphere only
- d. O water only



112. **Excretion processes and natural cycles together ensure.....**
- a. ☐ depletion of resources
  - b. ☐ the survival and sustainability of life in the biosphere
  - c. ☐ the cessation of sound waves
  - d. ☐ the freezing of the Earth
113. **Without decomposer organisms, the element cycles.....**
- a. ☐ stop
  - b. ☐ become gaseous only
  - c. ☐ accelerate
  - d. ☐ depend on the artificial kidney
114. **Which of the following reflects the importance of excretion in ecological balance?.....**
- a. ☐ Accumulation of wastes without decomposition
  - b. ☐ Cessation of carbon dioxide excretion
  - c. ☐ Decomposition of urea into ammonia in the soil
  - d. ☐ Absence of decomposer bacteria

## **Second : Essay questions :**

1. **Explain: why metabolic wastes are considered "by-products" despite originating from essential reactions?**  
.....  
.....
2. **Explain: The nephron is considered the functional unit of the kidney?**  
.....  
.....
3. **Give reason: Why losing large amounts of water is considered "dangerous to human life"?**  
.....  
.....
4. **Explain: The skin plays a dual role in human life?**  
.....  
.....



حمل الآن

مجاناً وحصرياً

# المراجعة رقم (4)

## اختبار شهر مارس





Lesson 1: The Biosphere and its Stability  
( Part One)



DR. BEDOOR  
Shehab

Model (A)

Choose the correct answer:

1- Which process represents the only "pathway" for water from the biosphere to the atmosphere according to the plant life cycle?

- A) Respiration  
C) Transpiration  
B) Photosynthesis  
D) Decomposition

2- What makes a lake is balanced ecosystem, according to you have studied

- A) The presence of fish only  
B) The depth of the water  
C) Its connection to the atmosphere  
D) The exchange of matter and energy between biotic and abiotic elements

3- In opposite figure: What is the ratio of the mass available to secondary consumers consider to producers?

- A) 0.187%  
B) 1.37%  
C) 4.62%  
D) 10%

$$\frac{11}{800} \times 100 = 1.375\%$$



4- Which of the following is expected to occur in the absence of decomposers from the ecosystem?

- A) Increased rate of energy transfer  
B) Increased in the number of top predators  
C) Faster plant growth  
D) Accumulation of organic matter

Essay :

5- How do you explain that a "biosphere" is a higher organizational level than an "ecosystem"?

The biosphere includes all biomes on earth's surface and each biome consists of several ecosystems that share similar climatic characteristics and dominant organisms



Lesson 1: The Biosphere and its Stability  
( Part One)

Model (B)

Choose the correct answer:

- 1- When individuals of the same species share the same place and time and interact for food, they form a .....
- A) Integrated ecosystem  
B) Biological population  
C) Hydrosphere  
D) Biological community
- 2- Plants are classified as "autotrophic" because they have the ability to.....
- A) consume organic matter from the soil  
B) convert inorganic matter into energy-storing organic compounds  
C) absorb oxygen to produce glucose  
D) survive without water
- 3- In opposite figure: What is the ratio of the mass available to primary consumers consider to producers?
- A) 0.187 %  
B) 1.37 %  
C) 4.62 %  
D) 10 %
- 4- "Tough fibers" in food are classified as ..... energy
- A) lost as heat  
B) used in movement  
C) resulting from respiration  
D) stored in waste



$$\frac{37}{800} \times 100 = 4.62\%$$

Essay :

- 5- Give reasons: The numbers of large predators (such as lions) are very few consider to the numbers of preys in the ecosystem?

due to the loss of energy when moving from one trophic level to another in the food pyramid , where only 10 % of the energy is transferred . Consequently the available energy can only support a small number of individual.



Lesson 1: The Biosphere and its Stability  
( Part One)



DR. BEDOOR  
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Model ( C )

Choose the correct answer:

1- The biosphere is considered an "integrated system" because .....

- A) Every organism in it lives in isolation from the others
- B) It is the largest sphere in terms of geological size
- C) The survival of organisms depends on complex interactions**
- D) It contains only rocks

2- A forest containing trees, insects, and birds represents a level of...

- A) Biological population
- B) Biological community**
- C) Individual
- D) Biome

3- In opposite figure: What is the ratio of the mass available to tertiary consumers consider to producers?

- A) 0.187 %**
- B) 1.37 %
- C) 4.62 %
- D) 10 %

$$\frac{1.5}{800} \times 100 = 0.187$$

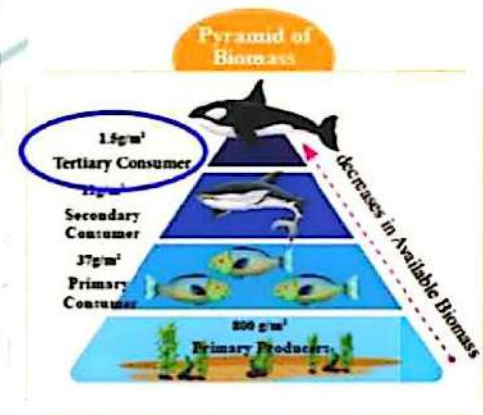
4- Which of the following organisms can perform photosynthesis ?

- A) Fungi
- B) Primary consumers
- C) Herbivores
- D) Some specialized bacteria**

Essay :

5- Explain: Why is a complex food web "more flexible" against changes ?

because it consists of multiple interconnected food chains where consumers do not depend on a single food source but rather on multiple sources. This makes the biological community more flexible against the loss of a single species





## Lesson 1: The Biosphere and its Stability ( Part Two)

### Model (A)

Choose the correct answer:

|    |                                                                                                              |  |            |
|----|--------------------------------------------------------------------------------------------------------------|--|------------|
| 1- | The chemical bond that stores the greatest amount of energy in the ATP molecule is located between . . . . . |  |            |
| A) | Ribose sugar and the nitrogenous base                                                                        |  |            |
| B) | The first and second phosphate groups                                                                        |  |            |
| C) | The second and third phosphate groups                                                                        |  |            |
| D) | Carbon and hydrogen in the sugar                                                                             |  |            |
| 2- | Adjusting diet pattern based on a CGM device improves .....                                                  |  |            |
| A) | Bone density                                                                                                 |  |            |
| B) | Stability of energy levels                                                                                   |  |            |
| C) | Speed of thinking only                                                                                       |  |            |
| D) | Heart rate                                                                                                   |  |            |
| 3- | The basic unit for measuring caloric content is ...                                                          |  |            |
| A) | kJ/g                                                                                                         |  | B) cal / J |
| C) | kCal/g                                                                                                       |  | D) kcal/J  |
| 4- | Which of the following does NOT contain nitrogen in its structure?                                           |  |            |
| A) | Immune bodies                                                                                                |  |            |
| B) | Enzymes                                                                                                      |  |            |
| C) | Muscles                                                                                                      |  |            |
| D) | Plant cell wall                                                                                              |  |            |



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### Essay Question

5- Explain: Genetic engineering plays a role in food sustainability despite climate change .

Scientists utilize genetic engineering tools used for DNA modification, such as the 'CRISPR-Cas 9' technology, which enables them to perform specific genetic edits. This is done for the purpose of adding new genes or removing undesirable ones to produce crops with improved traits and disease resistance.



## Lesson 1: The Biosphere and its Stability ( Part Two)

### Model ( B )

Choose the correct answer:

|    |                                                                                                                                 |  |            |
|----|---------------------------------------------------------------------------------------------------------------------------------|--|------------|
| 1- | "Cellulose is involved in building cell walls, while starch is for storage"<br>Which of the following explains this difference? |  |            |
| A) | <del>Difference in the elements composing them</del>                                                                            |  |            |
| B) | Difference in biological function                                                                                               |  |            |
| C) | Presence of phosphorus in starch                                                                                                |  |            |
| D) | Solubility of cellulose in water                                                                                                |  |            |
| 2- | Why does the cell not use glucose energy directly without an intermediate compound (ATP)?                                       |  |            |
| A) | Because glucose is a complex sugar                                                                                              |  |            |
| B) | Because glucose does not contain energy                                                                                         |  |            |
| C) | <del>Because ATP molecules have a simple structure</del>                                                                        |  |            |
| D) | Because ATP represents a continuous and renewable energy                                                                        |  |            |
| 3- | The unit most used in practice to measure the energy content of food is ...                                                     |  |            |
| A) | kJ/g                                                                                                                            |  | B) cal / J |
| C) | kCal/g                                                                                                                          |  | D) kcal/J  |
| 4- | A practical application resulting from using the electron microscope to study cell membranes is                                 |  |            |
| A) | Designing drugs that target specific proteins inside the cell                                                                   |  |            |
| B) | Improving the ability of organisms to produce energy                                                                            |  |            |
| C) | Increasing the rate of cell division                                                                                            |  |            |
| D) | Reducing the need for lipids in membranes                                                                                       |  |            |



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### Essay Question

They constitute the foundation of heredity in all living organisms and ensure the continuity of life within the biosphere. In eukaryotes, DNA is located inside the cell nucleus and carries the genetic information transmitted from one generation to the next.

5- Give reasons for: The presence of two types of nucleic acids (DNA and RNA) in living organisms .

While RNA participates in converting this genetic information into proteins, which play a vital role in executing various cellular functions



## Lesson 1: The Biosphere and its Stability ( Part Two)

### Model ( C )

**Choose the correct answer:**

|    |                                                                                             |    |          |
|----|---------------------------------------------------------------------------------------------|----|----------|
| 1- | "Chitin" in insects and "Cellulose" in plants are similar in the function of ....           |    |          |
| A) | Both are rapid sources of energy                                                            |    |          |
| B) | Both are stored in the liver                                                                |    |          |
| C) | Both dissolve in water                                                                      |    |          |
| D) | Both are involved in forming support structures                                             |    |          |
| 2- | Proteins are distinguished from carbohydrates by the essential presence of the element .... |    |          |
| A) | Carbon                                                                                      | B) | Nitrogen |
| C) | Hydrogen                                                                                    | D) | Oxygen   |
| 3- | If you have 1 Kcal, how much does that equal in Kilojoules?                                 |    |          |
| A) | 0.418 KJ                                                                                    | B) | 41.8 KJ  |
| C) | 418 KJ                                                                                      | D) | 4.18 KJ  |
| 4- | What might happen if there were no RNA in the cell?                                         |    |          |
| A) | Protein synthesis will stop despite the presence of DNA                                     |    |          |
| B) | Proteins will continue to be synthesized normally                                           |    |          |
| C) | The number of nucleotides in the DNA will increase                                          |    |          |
| D) | DNA will become capable of producing energy directly                                        |    |          |



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### **Essay Question**

5- Explain the role of mitochondria in "recharging" the ADP molecule .

Inside the mitochondria (cell organelle that considered the center of energy production in the cell), the active ATP molecule is regenerated from ADP using a portion of the energy released from glucose oxidation (cellular respiration)



## Model (A)

### Choose the correct answer:

- 1- If the leaves of a pine tree are coated with a waxy substance that blocks the stomata, the first process to stop will be  
A) Lignin production      B) Upward movement of water to the leaves  
C) Water flow in the phloem      D) Food storage
- 2- Modern technologies, such as Micro-CT Scanning (Micro-X-ray Computed Tomography), are used to  
A) Accurately image water and food transport mechanisms  
B) Kill pests      c) Increase growth rate  
D) Stimulate respiration
- 3- Blood pressure in the arteries is at its highest level during  
A) Ventricular diastole (relaxation)      B) Sleep  
C) When blood reaches the veins  
D) Ventricular systole (contraction)
- 4- If a substance is innovated to increase the efficiency of oxygen transport to the mitochondria, it is expected to  
A) Increase lactic acid fermentation  
B) Aerobic respiration switches to anaerobic respiration  
C) Increase the efficient in energy production  
D) Stop ATP production



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### Essay Question

- 5- Give reasons for: Hemoglobin affects blood viscosity .

since hemoglobin is the main protein within the red blood cells. The density of blood changes with the variation in the ratio of its components (especially hemoglobin). when hemoglobin Concentration increases , more RBCs are present and if there is an increase in the number of RBCs, the blood viscosity increase



Lesson Two: Biological Processes in Living Organisms  
and the Stability of the Biosphere (part one)

Model ( B )

Choose the correct answer:

- 1- Blood viscosity, as a physical property, mainly depends on ....  
A) affects the effort required to pump the blood  
**B) Concentration of protein and red blood cells**  
C) Oxygen percentage  
D) Adhesion force
- 2- The Cohesion-Adhesion theory depends primarily on the properties of ...  
**A) Water molecules** B) Food molecules  
C) Oxygen D) Carbon dioxide
- 3- Anaerobic respiration in human muscles during strenuous exercise results in the accumulation of  
A) Ethyl alcohol B) Glucose  
C) Glycogen **D) Lactic acid**
- 4- Storing sugars in roots during winter and transporting them to leaves in spring proves that transport in the phloem  
A) Depends on gravity  
**B) Occurs in two directions (bidirectional)**  
C) Occurs from bottom to top only  
D) Stops in extreme cold



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Essay Question

- 5- Explain: The presence of valves inside the heart contributes to maintaining the efficiency of blood circulation .

valves allow blood to flow in only one direction and prevent its backflow, ensuring a continuous and efficient blood flow to the body's organs



### Lesson Two: Biological Processes in Living Organisms and the Stability of the Biosphere (part one)

#### Model ( C )

Choose the correct answer:

1- Damage to the phloem in a tree leads to

- A) Roots drying out due to lack of water
- B) Death of roots due to lack of food supply**
- C) Increased salt absorption
- D) Stopping of transpiration

2- Which of the following processes is responsible for converting potential energy in food into active energy?

- A) Photosynthesis
- C) Respiration**
- B) Excretion
- D) Transport

3- Which of the following factors leads to an "increase" in arterial blood pressure?

- A) Increased resistance of arterial walls**
- B) widening of blood vessels
- C) Decrease in blood volume
- D) Slow heart rate

4- Anaerobic fermentation in yeast cells produces

- A) Oxygen
- B) Water only
- C) Lactic acid
- D) Ethanol**



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#### Essay Question

5- Explain: The importance of lignin in xylem vessels for tall plants such as trees .

It gives the vessels strength and stiffness and prevents their collapse. The lignin layer also helps to resist compression, allowing the vessels to maintain their shape even in the tallest plants.



3- using the chemical equation  $\text{H}_2\text{O}_{(v)} \rightarrow \text{H}_2\text{O}_{(l)}$ ,  $\Delta H = -44 \text{ K.J}$

Then heat change ( $\Delta H$ ) for condensation 2 mole of water = .....K.J

a) -88 K.J

b) +88 K.J

c) -44 K.J

d) +44 K.J

4- From the combustion equation of the hydrocarbon

hydrocarbon



Exothermic

(C = 12, H = 1)

If 84 grams of the hydrocarbon are completely burned, then .....

a) The surrounding medium gains 955 KJ of energy

b) The surrounding medium loses 2865 KJ of energy

c) The reactants lost 2865 KJ of energy

d) The surrounding medium gains 1910 KJ of energy

$$\begin{aligned} \text{no. of moles} &= \frac{\text{Mass}}{\text{Molar mass}} \\ &= \frac{84}{28} = 3 \text{ mol} \\ \text{amount of heat} &= 3 \times 955 = 2865 \end{aligned}$$

### Essay Question

5- Compare between exothermic reactions and endothermic reaction in term of

1- Sign of  $\Delta H$

$$\Delta H = -ve$$

$$\Delta H = +ve$$

2-  $H_R$ ,  $H_P$

$$H_R > H_P$$

$$H_R < H_P$$

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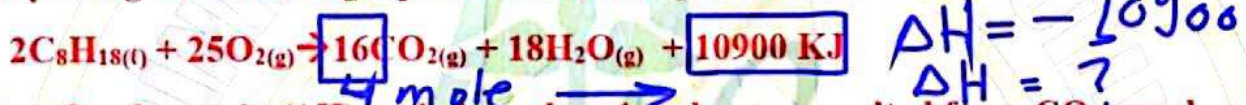
Choose the correct answer

$$1 \text{ mole of } H_2O = 2 + 1 = 18$$

1- Heat content of water is the sum amount of stored energy in ..... (H = 1 , O = 16)

- A- 1 L
- B- 18 g
- C- 22.4 L
- D- 1 Kg

2- By using the following equation of burning of octane :



Then the change in ( $\Delta H$ ) enthalpy when 4 moles are resulted from  $CO_2$  equal ...

- A- -5450 KJ
- B- +5450 KJ
- C- +2725 KJ
- D- -2725 KJ

$$\Delta H = \frac{4 \times -10900}{16} = -2725$$

3- If the heat enthalpy of reactant ( $H_R$ ) is 1250 KJ and enthalpy of product ( $H_P$ ) 1720 KJ then

$$\Delta H = H_P - H_R = 1720 - 1250 = +470$$

- A- The reaction is endothermic,  $\Delta H = +470$  KJ
- B- The reaction is exothermic,  $\Delta H = -470$  KJ
- C- The reaction is exothermic,  $\Delta H = +470$  KJ
- D- The reaction is endothermic,  $\Delta H = -470$  KJ

Endothermic



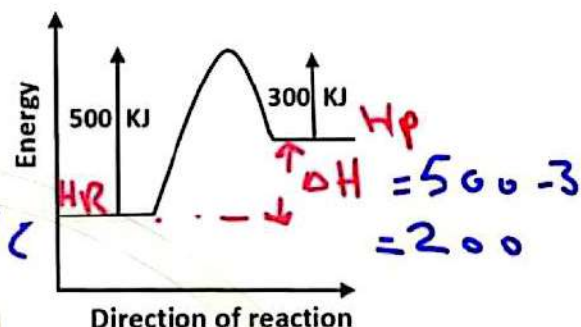
4-From the opposite diagram of energy , the value of  $\Delta H = \dots$

- A) + 200 KJ  
B) - 200 KJ  
C) + 300 KJ  
D) - 300 kJ

$$H_R < H_P$$

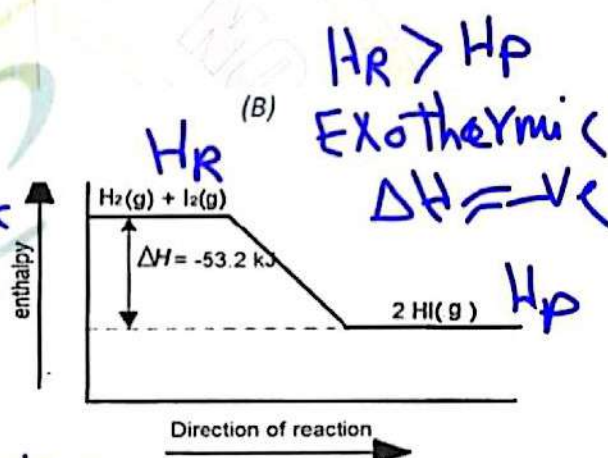
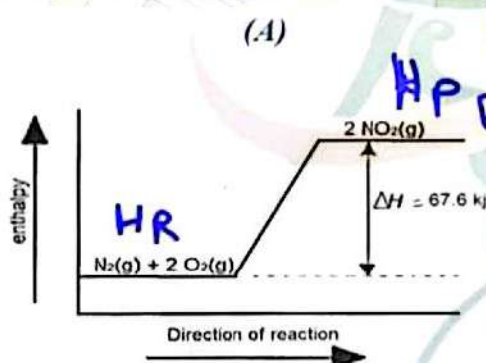
$$\Delta H = +V_c$$

Endothermic



### Essay Question

5- Study the following figures then answer



a- Which reaction required energy to occur? (A...)

b- Which reaction will increase the temperature of the surrounding medium?

(B...)

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**Model (B)**

**Choose the correct answer:**

1) *Ammonia* is a waste product resulting from the breakdown of.....

a) Starch

b) Amino acids

c) Fats

d) Glucose

2) Which of the following organ contribute to regulating both body temperature and salts?

a) Salivary glands

b) Endocrine glands

c) liver

d) Skin

3) which of the following metabolic waste it's accumulation increases blood acidity?

a) Carbon dioxide

b) Mineral salt

c) Urea

d) Ammonia

4) *Metabolism* is a process of .....

a) Catabolism only

b) Anabolism only

c) Both catabolism and anabolism

d) Excretion only

**Essay Question**

5- Explain: The nephron is considered the functional unit of the kidney.

It has the main role in filtering the blood Where wastes are removed from the blood, while useful substances such as glucose, ions, and water are returned to the body in the amount needed by the body in a process called reabsorption, to maintain homeostasis



## Model (C)

### Choose the correct answer

- 1) When examining a urine sample from a patient, it was found to contain large amounts of glucose. This may indicate a defect in the process of.....
  - a) Filtration
  - b) Storage of urine
  - c) Reabsorption
  - d) Excretion
- 2) An increase in the concentration of sodium ions in the blood directly affects
  - a) Rate of breathing
  - b) Kidneys activity
  - c) Production of skin pigment
  - d) Breakdown of hemoglobin
- 3) The breakdown of hemoglobin resulting from the destruction of old red blood cells produces the substance
  - a) Ammonia
  - b) Urea
  - c) Uric acid
  - d) Bilirubin
- 4) The relationship between "catabolism" and metabolic waste products is
  - a) Direct; increased catabolism increases waste products
  - b) Inverse; catabolism reduces waste products
  - c) constant; unaffected by activity
  - d) Metabolic waste products are limited to the products of anabolism only

### Essay Question

#### 5- Explain: The skin plays a dual role in human life.

It has a dual role in protection and excretion.

protection through Epidermis that protects the body from microbes and water loss. Furthermore, the expulsion of water, salts, and a very small percentage of Urea with Sweat is considered a form of excretion that helps maintain the balance of fluids and ions within the body.





## Lesson Two: Biological Processes in Living Organisms and the Stability of the Biosphere (part two)

### Model (A)

Choose the correct answer:



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1- From the equation:  $2C_{(s)} + 2H_{2(g)} + 52.3 \text{ kJ} \rightarrow C_2H_{4(g)}$ , It can be concluded that.....

a- the medium acquires heat.

Endothermic

Exothermic X

b- heat transfers from the surrounding medium to the system.

c- the system loses heat.

Exo X

d- heat transfers from the system to the surrounding medium

Exo X

2- Why must a chemical equation be balanced when calculating enthalpy change?

a- To achieve the law of conservation of energy.

b- To achieve the law of conservation of mass

c- To keep the temperature constant

d- To determine the type of reaction (endothermic/exothermic).

3- Equal amounts of four different substances (A, B, C & D) were added separately to equal amounts of an acid and a thermometer placed in each mixture. For which mixture is the reaction the most exothermic?

the highest rise in Temperature

A. mixture (A) temperature rises by  $3^\circ\text{C}$

B. mixture (B) temperature rises by  $5^\circ\text{C}$

C. mixture (C) temperature falls by  $3^\circ\text{C}$

D. mixture (D) temperature falls by  $5^\circ\text{C}$



**Choose the correct answer:**

1) **Ultrasound waves of high frequency** are specifically used because they ....

- a) kill bacteria
- b) heat tissues
- c) provide high resolution for imaging small details**
- d) travel faster than light

2) **Carbon moves from plants to animals through ....**

- a) respiration
- b) evaporation
- c) decomposition
- d) feeding**

3) **The decomposition of urea in soil by bacteria produces .....**

- a) ammonia and then nitrates absorbed by plants**
- b) oxygen gas
- c) rock phosphates
- d) sound echoes

4) **The process that releases phosphorus from rocks is called .....**

- a) Respiration
- b) Evaporation
- c) Weathering**
- d) Nitrification

**Essay Question**

**5- Explain: Phosphorus is not considered a pollutant of the atmosphere.**  
Phosphorus compounds are found in rocks and soil. the atmosphere is not part of the Phosphorus cycle; instead, the Phosphorus cycle remains confined between the biosphere, lithosphere, and hydrosphere



**Model (C)****Choose the correct answer****1) The strength of ultrasound wave reflection depends on ....**

- a) the acoustic impedance of the tissue      b) the color of the organ  
c) its temperature      d) the amount of urea in the blood

**2) The role of factories in the carbon cycle is .....**

- a) absorbing carbon      b) releasing carbon oxides  
c) fixing nitrogen      d) recycling proteins

**3) Eliminating nitrogen-fixing bacteria in the soil leads to .....**

- a) increased protein production in plants  
b) increased rate of cellular respiration  
c) accumulation of nitrogen gas in the atmosphere  
d) decreased soil fertility

**4) Which of the following reflects the importance of excretion in ecological balance?**

- a) Accumulation of wastes without decomposition  
b) Cessation of carbon dioxide excretion  
c) Decomposition of urea into ammonia in the soil  
d) Absence of decomposer bacteria

**Essay Question****5- Explain: Animal respiration contributes to the sustainability of plant life.**

When living organisms respire, they produce Carbon dioxide gas to the atmosphere again as a waste product. carbon dioxide gas is the essential gas for plant to Perform photosynthesis process to produce its own food



## Lesson Three: Excretion and Homeostasis, and Their Role in the Stability of the Biosphere

### Model (A)



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Choose the correct answer:

- 1) The accumulation of metabolic wastes directly leads to.....
  - a) Increase rate of catabolism
  - b) Decrease in temperature
  - c) Increase efficiency of cells
  - d) Disturbance of the chemical balance of fluids
- 2) The subcutaneous layer functions as.....
  - a) A barrier against microbes
  - b) A filter for blood
  - c) A thermal insulator due to its fat content
  - d) A producer of sweat
- 3) The accumulation of bilirubin in the body leads to .....
  - a) Jaundice
  - b) Bile
  - c) Asthma
  - d) Dehydration
- 4) Which excretory organ would be most affected when consuming foods containing dyes?
  - a) Lungs
  - b) Liver
  - c) Bladder
  - d) Skin

### Essay Question

5- Explain: why metabolic wastes are considered "by-products" despite originating from essential reactions.

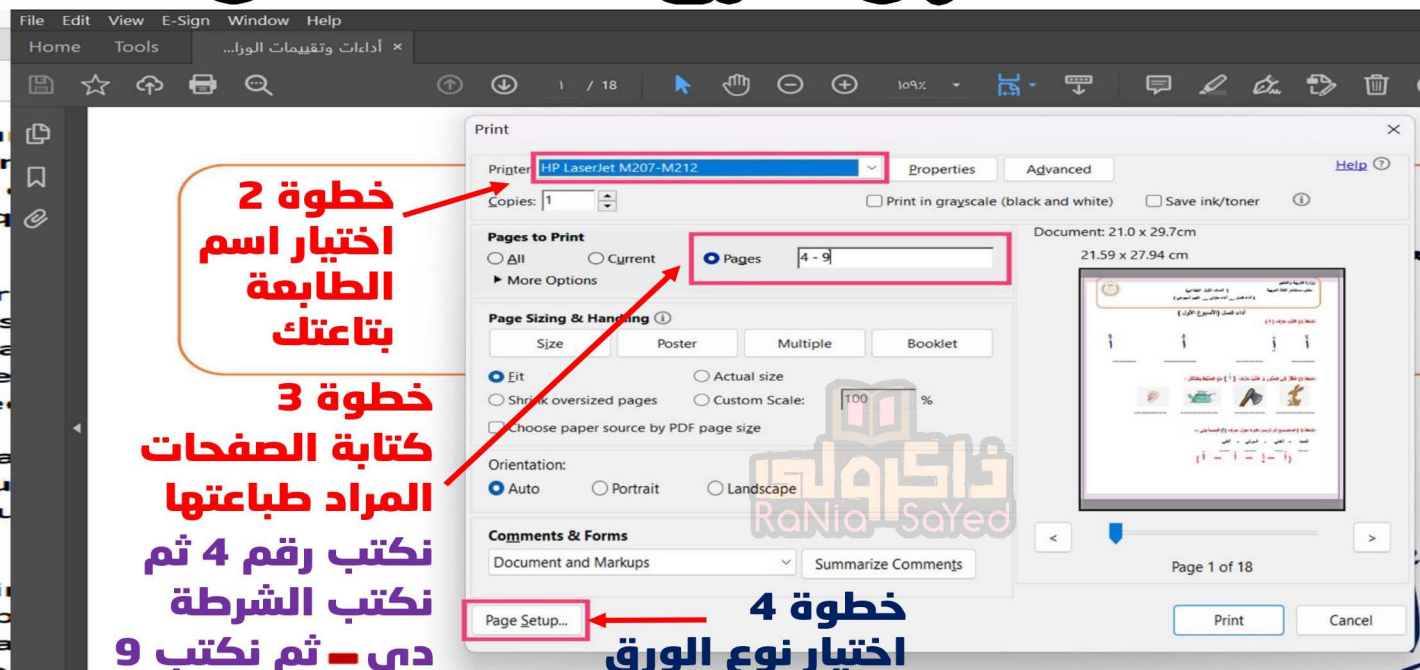
Since the accumulation of these wastes leads to a disruption in the chemical balance of the body fluids and affects the efficiency of cell function, the organism requires a precise mechanism to eliminate them where the main role of metabolism is obtaining energy from food (Catabolism), building essential biological molecules (anabolism)



# كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



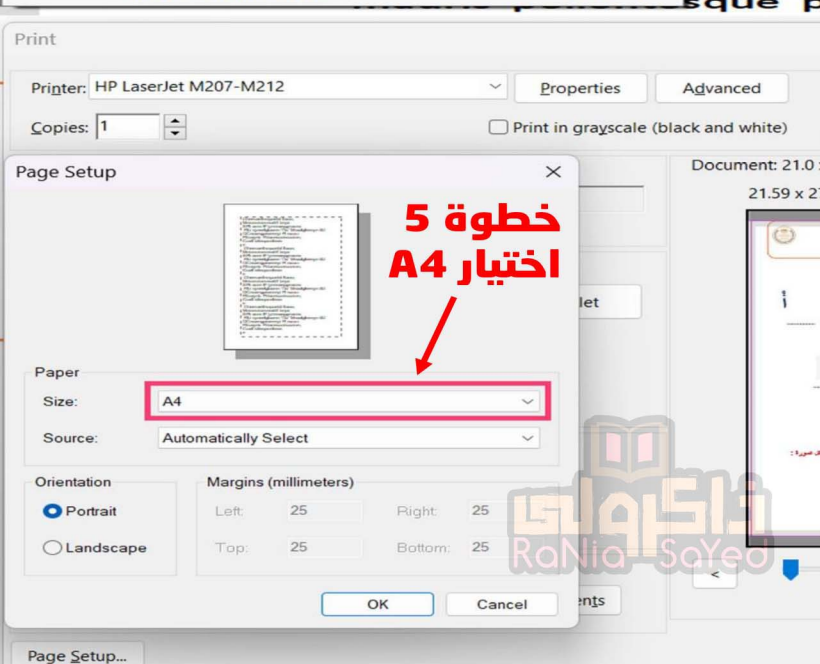
خطوة 1



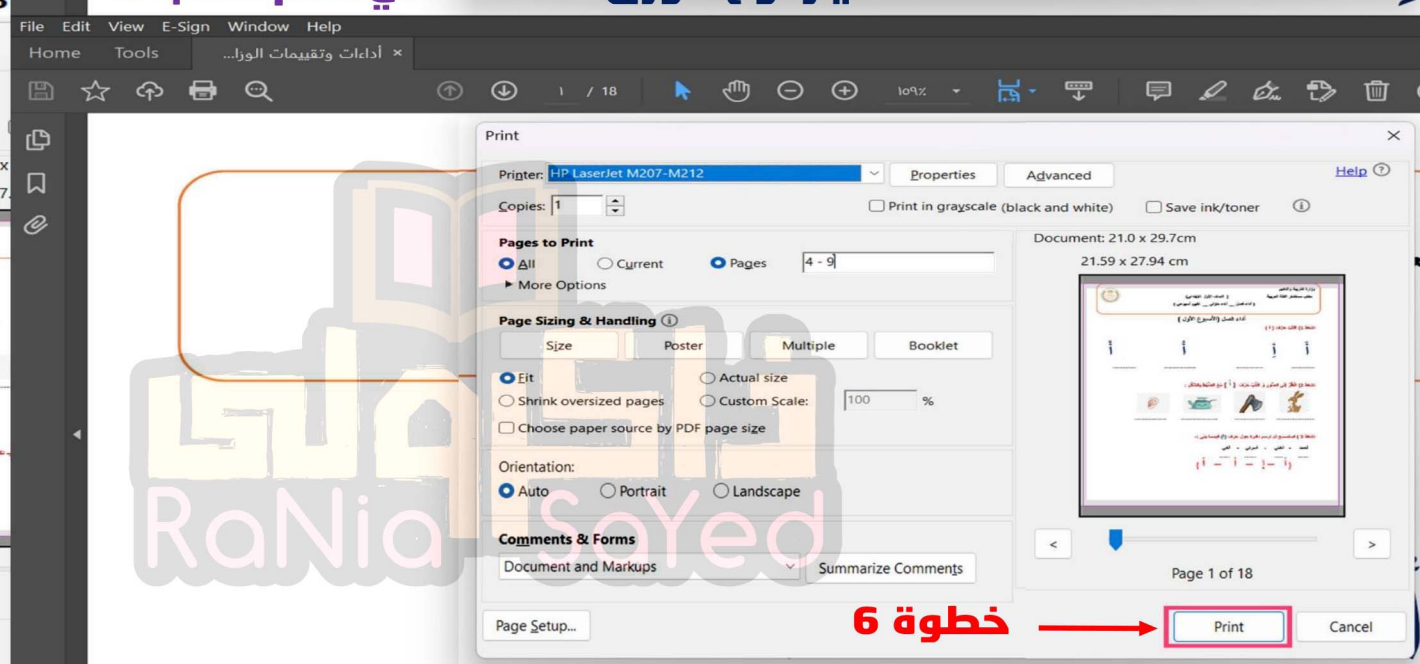
خطوة 2  
اختيار اسم  
الطابعة  
بتاعتك

خطوة 3  
كتابة الصفحات  
المراد طباعتها  
نكتب رقم 4 ثم  
نكتب الشرطة  
دي - ثم نكتب 9

خطوة 4  
اختيار نوع الورق



خطوة 5  
اختيار A4



خطوة 6